



CHEETAL

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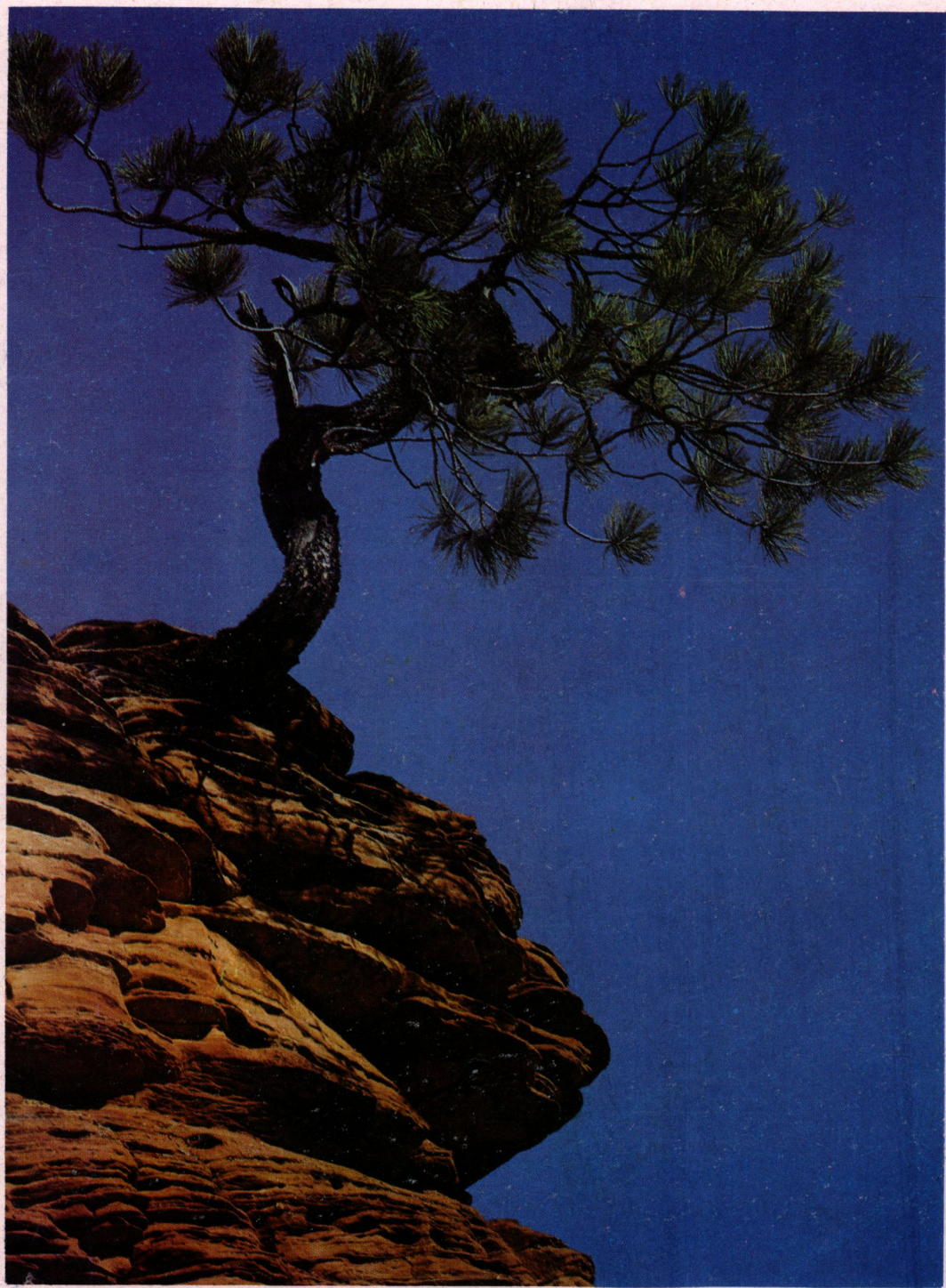
Dehradun, 2001

Nos. 3 & 4



Tiger in its natural habitat

Photo by : A. S. Negi



Editorial

The photograph on the opposite page shows how a small ponderosa pine tree is holding a big chunk of rock. This rock would have disintegrated and fallen long back but for this single pine tree, whose roots have held it fast *in situ*. Imagine, when a single tree, which by itself is making a precarious living on sheer rock, can hold so much rock how much soil would be protected from washing away by an entire forest. Trees protect soil from the onslaught of rain and their roots bind the soil and conserve it from being eroded. Trees check the run-off and help the rainwater go underground. The role of trees in soil and water conservation is pre-eminent. Each year tens of million tonnes of surface soil is washed down by rains, silting water reservoirs and canals, and inundating fertile arable land in the plains. Trees can check all this.

The onus of tree planting in government forests lies on the Forest Department and they are doing their bit. Village Panchayats and voluntary organisations are engaged in planting up gaon samaj land and waste land with much ado. But the results are imperceptible. Most of the planting efforts of the government and non-government agencies are washed out for want of protection and after care.

We have seen that millions of saplings have so far been planted under the euphoria of **Van Mahotsava**. But where have they gone? Desired success in tree planting cannot be achieved unless we develop emotional bond with the trees we plant. Mere ritual of tree planting will not yield results. It would, therefore, be appropriate that each able bodied person plants at least one tree in his/her life time and ensures its survival. This will make India greener by 1000 sq. kilometres each year.

I.S. Negi

Views expressed in this journal are solely of the authors and the editor or the Wildlife Preservation Society of India are not in any way responsible for them.

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Habits and Habitat of Tiger

By

I.S. Negi, I.F.S. (Retd.)

Introduction

TIGERS are found throughout India, from Himalayas to Kanya Kumari, except the states of Haryana, Punjab, Himachal Pradesh and Jammu & Kashmir. They are found in good numbers in areas with dense forests and are scarce in scrub jungles in this country. The jungles most preferred by tiger are those that are green, thick and continuous with plenty of water supply in the form of perennial streams or water pools. They favour a broken country with low hills and green bushes and above all with good supply of their natural prey animals (deer, pigs, etc.) or village cattle (for cattle lifters).

The Habitat

In India the Tropical Moist Deciduous Forests, that occupy Terai-Bhabar and Doon regions of Uttaranchal, Terai of Uttar Pradesh and Bihar bordering Nepal, parts of Assam, Meghalaya, Tripura, Nagaland, West Bengal, parts of Orissa, eastern Madhya Pradesh and Kerala make an ideal habitat for tiger. A number of Tiger Reserves, viz; Corbett (Uttaranchal), Dudhwa (Uttar Pradesh), Manas (Assam), Palamau (Bihar), Buxa (West Bengal), Kanha (Madhya Pradesh) and Periya (Kerala) are located in these forests. Infact these forests are prime tiger habitat.

The tiger has successfully inhabited the Tropical Dry Deciduous forests of

Karntaka, Maharashtra, central and southern Madhya Pradesh, parts of Bihar, Orissa and Andhra Pradesh. The Tiger Reserves of Bandipur (Karnataka), Melghat (Maharashtra), Indravati (Madhya Pradesh), Simlipal (Orissa) and Nagarjun Sagar (Andhra Pradesh) are situated in these forests.

Tiger is also thriving well in Sundarbans, where the thick and impregnable mass of estuarine mangrove forests afford protection to it against poachers. It is indeed a safe haven for the tiger. Besides the above, Sariska and Ranthambhore Tiger Reserves harbour quite a number of tigers due to the preponderance of prey animals and domestic cattle from the villages surrounding the park.

It may be reckoned that nearly half of the total population of tigers in India is found in 25 Tiger Reserves, as per statistics given below:-

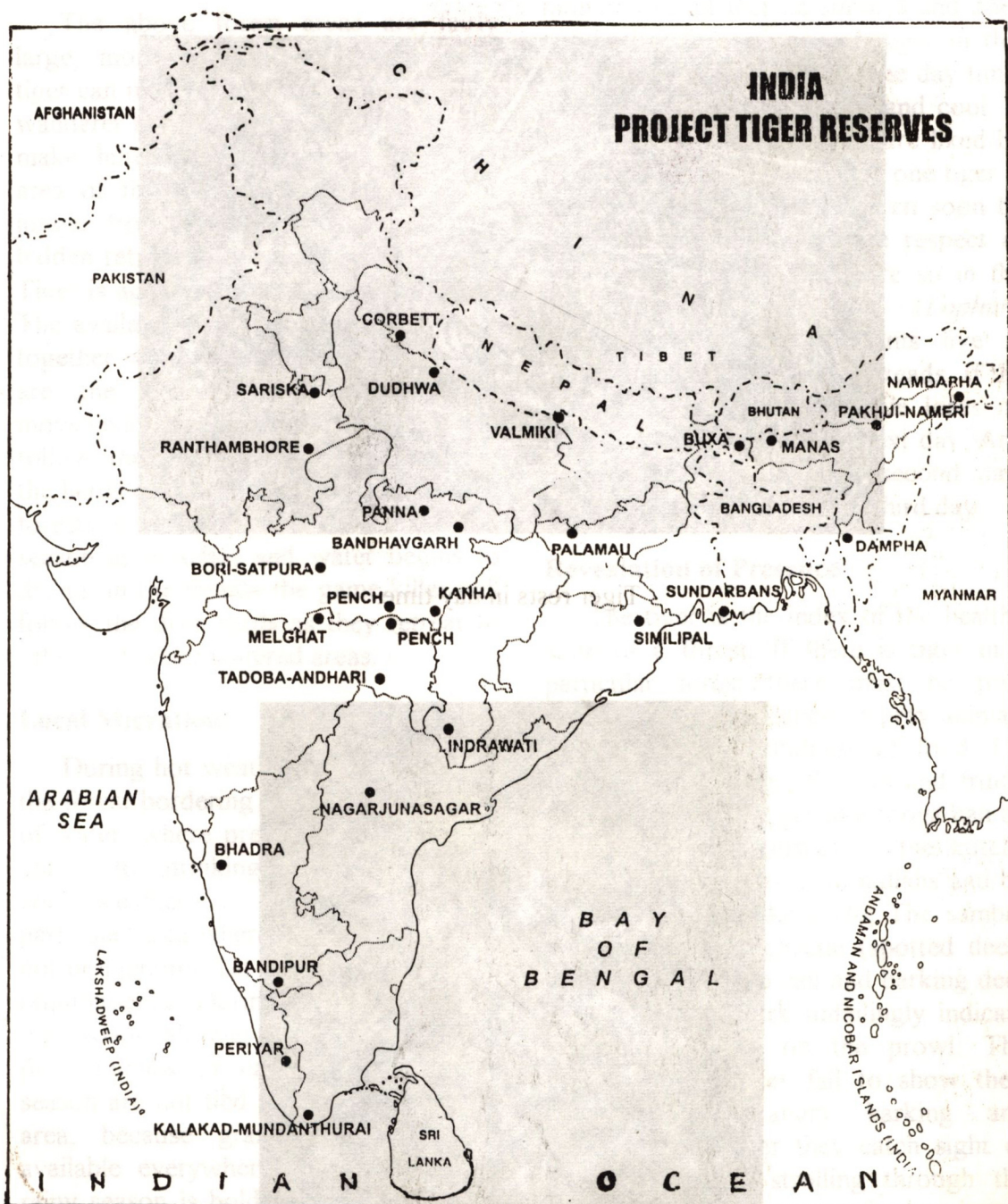
Table 1: Tiger population in various states- (1997 Tiger Census)

Andhra	-	183	Meghalaya	-	63
Assam	-	458	Mizoram	-	12
Bihar	-	103	Orissa	-	194
Daman & Diu	-	6	Rajasthan	-	58
Gujarat	-	1	Sikkim	-	4
Kerala	-	68	Tamil Nadu	-	62
Madhya Pradesh	-	927	Uttar Pradesh	-	475
Maharashtra	-	257	West Bengal	-	361
			Total	-	3232

Table 2
Tiger population in 25 Tiger Reserves- (1997 Tiger Census)

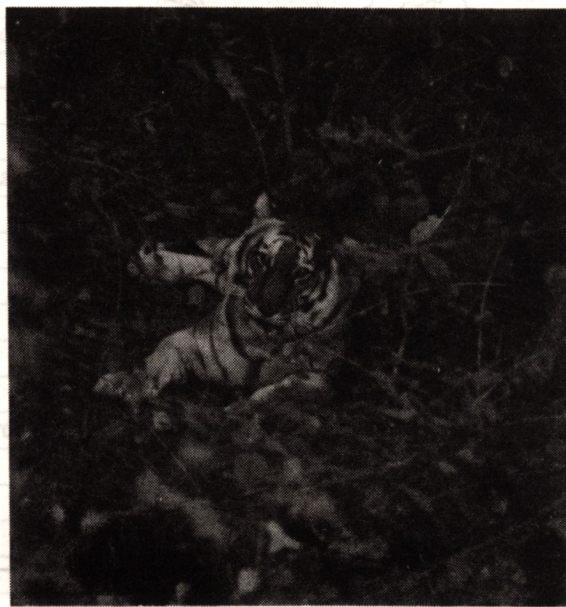
Sl. No	Name of Tiger Reserve	State in Which Situated	Area in Sq. Km.	No. of Tigers
1	Bandhavgarh	Madhya Pradesh	1093	46
2	Bandipur	Karnataka	880	75
3	Bhadra	Karnataka	492	34
4	Buxa	West Bengal	759	32
5	Carbett	Uttaranchal	1316	138
6	Dampha	Mizoram	NK	5
7	Dudhwa	Uttar Pradesh	811	104
8	Indravati	Madhya Pradesh	1258	15
9	Kalakad Mundanthurai	Tamil Nadu	800	28
10	Kanha	Madhya Pradesh	1945	114
11	Manas	Assam	2446	125
12	Melghat	Maharashtra	1677	73
13	Nagarjun Sagar	Andhra Pradesh	3568	39
14	Namdapha	Arunachal Pradesh	1808	57
15	Palamau	Bihar	1026	44
16	Panna	Madhya Pradesh	543	22
17	Pench	Madhya Pradesh	758	29
18	Pench	Maharashtra	372	14
19	Periyar	Kerala	777	39
20	Ranthambhore	Rajasthan	1300	32
21	Sariska	Rajasthan	1145	24
22	Simlipal	Orissa	2750	98
23	Sundarbans	West Bengal	2585	263
24	Tadoba	Maharashtra	620	42
25	Valmiki	Bihar	880	53
Total			32454	1545

Source:- Tiger Update. April 1999. a WWF- India Publication.





Tiger rests in day time.



And hunts by the night

Photo by Narendra Singh

Tiger is a Wanderer

The above forest areas are fairly large, more or less contiguous where tiger can make extensive beats. Tiger is a wanderer by nature. It is rare that he will make himself confined to a restricted area of forest or an isolated patch of jungle from where he cannot beat a hidden retreat to more extensive forests. Tiger is agile and is always on the move. The availability of prey animals or cattle together with the changes of the seasons are the factors that determine the movement of tiger. Cattle-lifter will follow the migrations, which occur in the herds of cattle brought to graze in the forests at different seasons. As the hot season approaches and water begins to dry up in the forests the game killer will follow the deer herds as they retreat to other and better watered areas.

Local Migrations

During hot weather the tiger inhabits the forest bordering rivers or large pools of water, where prey animals and cattle collect for drinking water. During the cold weather the tiger takes up a particular area where, though water may not be plentiful, yet it is sufficient for its requirements. During rainy season the tiger roams all over the area in search of prey animals or cattle, which at that season are not tied down to a particular area, because grazing and water is available everywhere. The tiger during rainy season is bolder and less cautious than at any other due to excessive growth of vegetation and abundance of

prey animals. He considers himself the monarch of all that he surveys and does not bother for any one. A tiger in this season may come across in the day time, when the weather is cloudy and cool. It is strange that certain spots are liked by tiger more than others and if one tiger is shot or dies, his place is taken soon by another. This is also true in respect of many wild animals, but more so in the case of Kalij pheasants (*Lophura leucomelana*). Kalij pheasants live in pairs in nullahs near village steads. If the male Kalij is shot the female loses no time and calls a new male next day. And if new male is also shot second day, another male will appear on third day.

Revelation of Presence

The tiger is the index of the healthy state of a forest. If there is tiger in a particular forest there must be prey animals. And abundance of prey animals indicates the plentifulness of food, i.e. grass, fodder leaves, flowers and fruits. The presence of a tiger in a forest can be disclosed by pug marks on the kutchra roads, beaten tracks or in nullahs and by calls of deer, monkeys etc; The sambar with its bell, the cheetal (spotted deer) with its shrill sharp call and barking deer with its hoarse bark unfailingly indicate that the tiger is on the prowl. The monkeys will never fail to show their excitement by angry barking and coughing whenever they catch sight of tiger or panther strolling through the forest. Birds, such as pea fowl or jungle fowl also resent the appearance of a tiger.

Commands The Respect of Wild Animals

The wild animals especially the carnivores have their own beats. But it is not uncommon to see tigers, leopards, bears and elephant living in the same forest. In that case bears and leopards take care not to offend the tiger. The tiger is acknowledged by rest of the wild animals as the king of the forest and there is none that does not get out of his way when he is roaming through his domain. They maintain a respectable distance from him. The only forest inhabiting animal that shows no respect for the tiger is the wild dog (*Cuon alpinus*). These rare but destructive beasts are often the cause of tiger quitting a jungle he is fond of. Till the beginning of fifties Kilberry (altitude 6000'-7000'), a dense oak forest near Nanital was a regular haunt of tiger due to abundance of sambar. In early fifties a nasty pack of wild dogs came there and within a span of a few years multiplied to such a large number that they not only wiped out the entire population of sambar but harassed the tigers to such an extent that the king of the forest had to abandon the area, not to return there again.

Notional Differentiation

In India there is only one species of tiger and that is *Panthera tigris tigris*. There are not even two recognized varieties of tiger. Yet the villagers and forest dwellers roughly differentiate the

tiger into two kinds— the *Lodhia bagh* and the *Oontia bagh* because of its coat resembling that of camel at a particular season. The former is game killer and the latter cattle lifter. This differentiation is probably based on different habits and habitats of the tiger. The tiger which inhabits mountaneous or hilly region is generally a smaller and thicker animal than that of the plains grass jungles. Similarly the tiger that depends solely on game killing is more active and smaller animal than the lethargic and hefty cattle lifter. However, this division into two kinds is purely conventional and has no scientific basis. Tigers also differ in temperament, build and colouring. Some are cunning and coward at heart while others are bold and adventurous.

Natural Instincts

The instinctive cunning of tiger is highly developed specially in man-eaters. There is no other wild animal that can approach him in cunning and stealth. Even a smallest sound or slightest suspicious looking object in the vicinity of the 'kill' will send a tiger sneaking away, only to return during late night. No animal is more careful or suspicious of traps than tiger, his precautions amounting almost to cowardice. Though he may apparently be strolling carelessly, nothing in his surroundings escapes his notice and his hearing picks up the faintest sound.

Tiger has a poor sense of scent. He relies solely on his hearing power and

keen eyesight. In his nightly prowls in search of prey he will invariably take to roads, dry river beds and beaten game tracks on which his foot steps are inaudible, while he is in a position to hear and see all movements around him. On hearing any sound he either moves towards it stealthily or crouches down and awaits the approach of the animal that made it. The quietness of tiger's movement over the ground strewn with dry leaves, especially when approaching the prey is marvellous. It is astonishing to find that the tiger could reach and pounce upon the prey without making the smallest sound, when the whole ground around is thickly covered with dry leaves and a man walking over it would have been heard a hundred meters away.

Feints and Approaches

The tiger does not depend upon its speed but on his cunning and stealth of approach to procure his prey and seldom follows up an animal that has become aware of his presence. In fact the tiger will either not chase the wary animal or will soon give up the chase once the animal starts fleeing. In a direct chase the tiger may succeed once out of every twenty chances in killing the prey. For killing its prey the tiger mostly relies on ambush by concealing itself amidst the bushes or tall grass. It is really noteworthy how a big animal like a tiger with the help of its colouring can make himself almost indistinguishable, in even light cover, so much so that a wary

sambar stag cannot ascertain that the indistinct object crouching behind a few blades of grass is really a tiger, ready to pounce on him. The stripes and colour contrast on the coat of tiger make for invisibility and help camouflage him in a most effective manner. The coat of the tiger is very attractive and has been prized for trophies in the past. The tiger carries his best coat during the period between the months of September and March.

Game Killers

The tiger which mostly depends on prey animals (deer etc.) for food will generally frequent large expanses of forests, where human habitation is far and few between, but prey animals are plentiful. He seldom travels to the outskirts of the forest and thus not being tempted by the sight of cattle continues to live his peaceful life, as game killer. He sleeps in day time and hunts by night. His peaceful life, far away from human beings, in the deep of forests has a tendency to make him into a retiring and shy animal as regards temperament. Taken as a whole most tigers will retreat before man especially during day time and there is very little to be feared from a tiger if met with accidentally so long he is not offended. His constant wanderings and exertions in search of game make him flexible and active physically, preventing him from putting unnecessary flesh and weight. There is no doubt that as he ages and becomes less active and energetic he gradually

turns to cattle-lifter and from which he eventually turns into a man-eater. It is rare that a game killing tiger jumps the intermediate stage of cattle-lifter and takes directly to man-eating.

Modus Operandi

The tiger strikes at an animal with his paws, solely with the object of crippling it and preventing its escape till he can get a grip of its throat. The stroke of his paw is powerful enough to break the backbone of a buffalo. There is some controversy regarding tiger's method of killing its prey. But the general opinion is that he always dislocates or breaks the neck some say by the grip of his jaws on the nape of the neck, others say by the grip of the throat. But the commonest method is dislocation of the neck which causes immediate and sure death and consequently the animal is gripped by the throat. Many people have witnessed the tiger dragging its prey by the grip of throat. The tiger has a great aversion to feeding on its 'kill' in the open and as far as possible drags it to the nearest cover or nullah before he commences his meal.

The amount of flesh a tiger consumes at a sitting depends on the extent of his hunger and the time at his disposal before he expects to be disturbed. A hungry tiger will devour practically all the flesh of both hind legs of a bullock at a single meal and on his return the next night after pulling the carcass further

into the jungle will finish the whole of it, leaving only the head and bones. The reason for dragging the carcass and concealing it is to protect it from vultures and keep it closer to guard it from sniffing hyenas and jackals.

Cattle-Lifters

About eighty percent of the tigers are cattle-lifters and rest game killers. The cattle-lifter is not always born of cattle lifting parents and more often than not starts as a game killer. It is only due to force of circumstances or advancing age that a tiger adopts the less strenuous life. Cattle lifting is a very simple task for a tiger (a bullock or buffalo does not offer resistance), whereas stocking game animals requires ten times more skill and energy. A cattle-lifter would generally be found lurking near villages, which keep herds of cattle. Also a forest within easy range of grazing herds, so long it holds some tree growth, a few water pools and some patches of evergreen bushes, will suit a cattle lifting tiger. A cattle-lifter pays regular visits to the forest neighbouring villages. The villagers soon begin to draw in their cattle after the tiger has killed one or two. The beast then moves to new areas where he may be an unexpected guest and where he hopes to pick up few straying cows or buffaloes forgotten or left in the jungle by some careless herdsmen. After enjoying the hospitality of these villages for a week, he moves on to other areas where he hopes to find yet more hospitable ground.

A cattle-lifter is generally a bigger animal. It is more lethargic and less active than the tiger who solely depends on game killing as the seizure of the prey he lives on does not entail the same amount of restless and tiresome journeys through the forests as the game killer has to undertake for procuring his food. The tending of the village herds is relegated to village urchins who have very hazy ideas of the responsibility and the cattle-lifter can always rely on patience and perseverance bringing his reward in the shape of a cow or buffalo left behind in the jungle. One kill in the shape of a cow or buffalo will suffice for two to three days and it is only on the fourth or fifth day after he has finished his last 'kill' that he begins to seriously search for his next meal. He does not restrict his diet entirely to beef, but is always willing to lay hands on a deer, a pig or even such a small fry as pea fowl or jungle fowl.

A cattle-lifter is a bold animal and is prepared to take some amount of risk in procuring food. At times, especially when hungry, he is bold enough to try and intimidate the herdsmen in broad day light. Any resistance on the part of herdsmen is fraught with danger and may invite the wrath of the tiger. In this game of seizure and denial a tiger may attack and kill the herdsman. A few instances of man killing may lead a tiger to becoming habitual man-eater.

Man-Eaters

The third category of the species is that of man-eater. This classification is

based solely on the habits of the animal. A game killer or cattle-lifter is transformed into a man-eater purely due to circumstances. However, there is every possibility that the off-spring of a man eating tigress, unless their mother is killed while they are still very young, will adopt her mode of living when they grow young. A tiger that has once killed a man, but may not have eaten him or may have possibly moved away from the scene, becomes conscious of his own strength and on a second encounter with a human being will not hesitate attacking him. And from the moment he kills a second man, nothing will prevent him from becoming a confirmed man-eater, especially when he is able to eat the flesh of the second victim.

A man eater is generally an old animal or one who has been incapacitated by some wound or infirmity at the time of catching a prey. Amongst the man-eaters tigresses are more common and the reason for this is that when she is about to have her cubs, she retires to an out of way place in order to get away from her mate, knowing that the male would kill her cubs so that she may become ready for mating sooner than the normal two to three years gap. Food is often very difficult to procure in such places and the urgency to feed her cubs forces her into man-eating some time or the other when deer or cattle are not seen around. In the case of man-eaters a tigress is bolder, more cunning and always more savage than the tiger. A man-eater hunts more frequently those villages where it

had once killed a man. Those unfortunate villagers always remain on tenterhooks and their life becomes miserable. The ordinary tiger, cunning and cruel he may be, looks sober and downright as compared to a man-eater. The man-eater is coward at heart and will get scared if it has the smallest suspicion that it is being sought for. Even when it does attack a human being, it will be from behind and it is very rarely that it will attack people from the front. Women, children and physically weaker persons generally fall victim of man-eaters. It is seldom that a healthy and wary person is attacked by a man-eater. He is not fond of seeking his victims in the cultivated fields around villages, as the panther does, but will haunt roads and paths in the forest itself and will lie patiently in wait for unsuspecting passer-by, taking either a solitary man or allowing a whole file of them to pass by before rushing out and snatching the last one.

A man-eating tiger is even a great wanderer than a cattle lifter, killing at places fifteen to twenty miles apart on two consecutive nights. He has a very wide range of operation and it is extremely difficult to locate him and bring to bag. It is only by chance that he meets his end as due to his constantly shifting his quarters any systematic hunting down of him, as is done with other tigers, is doomed to failure. The only surest chance of shooting him is when he is caught red handed at his gruesome work or when he comes next to the carcass of the person he killed and on having been disturbed from the 'kill'

either not eaten it or only half eaten. Otherwise he will continue to live for many years and terrorise the inhabitants of the area. Altogether a man-eater is an absolute curse and a sportsman should grasp every possible opportunity of bringing any man-eater he hears to book.

For shooting man-eaters the local government proclaims suitable rewards on his head in proportion to the number of victims he claimed and on his general wickedness. It seems that the cunning and clever man-eater is aware of this for he continues to elude the numerous local shikaries who tempted by the reward do not leave any stone unturned to shoot him, by laying ambush from trees on his expected path and water pools. But like every thing else in this world a man-eater's time for dissolution arrives and he meets his end, generally under circumstances he was not apprehensive of danger. The local villagers cannot say with any certainty that the tiger last shot was the dreaded man-eater, till full six months have passed during which no case from near vicinity has been reported. This is also the proof government requires before it releases the proclaimed reward for the destruction of these pests. A man-eater is bound to die and die much before his natural death at old age.

Longevity

As regards the age to which tigers are said to live, it is rather impossible to determine the same in case of tigers living in the wild. Even in zoos it is equally difficult to say with some certainty whether a tiger had died form

old age or from some illness. The latter is more common case as confinement and unsuitable feeding might affect the health of the animal, who is accustomed to covering long distances in search of prey. More over the fresh flesh of prey animals is vastly different to the lumps of stale meat fed to them in zoo enclosures. Rich warm blood and the hair covered skin of tiger's natural prey play an important part in keeping it fit and healthy. The hairs play useful role in the function of digestion.

Reproduction

Mating season is February-march. The period of gestation is approximately four months. The clubs are born in the beginning or middle of rainy season. As many as four cubs are born. But it is very seldom that more than two survive to grow-up. Among the mature animals tigresses out-number the males. The natural corollary is that the male tigers kill all the small male cubs they come across as they see in them their future rivals.

The cubs are born blind and as they grow older, are fed with lumps of meat vomited by their mother on her return from a feed. The cubs are kept well hidden in a den or dark nullah or in a dense patch of grass. As they grow up they are taken out by the mother in her nightly prowls. The cubs stay with the mother for two to two and a half years, when they are able to fend for themselves.

Rehabilitation

The tiger has suffered a great deal in the last century due to loss of habitat, coupled with indiscriminate shooting for trophies and in recent times for bones and other body parts being used in country medicines. This resulted in a sharp decline in the population of tiger. Whereas there were more than 40,000 tigers in India at the turn of twentieth century a bare 3750 are left now. For the rehabilitation of tiger the Government of India, with the aid of WWF-International, has launched the ambitious Project Tiger, the success of which lies in the womb of future.

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Cheetal (*Axis axis*). Habitat Utilization and Diurnal Activity Pattern in Udanti Wildlife Sanctuary, Raipur, Chhattisgarh

By

P.C. Kotwal* & Rajendra Prasad Mishra**

Introduction

*Cheetal or Spotted deer (*Axis axis*) is a common deer species found in open scrub/forest and in and around national parks and wildlife sanctuaries. In the past, the cheetal population was abundant in forest areas in central India. The population gradually decreased over the time due to combined effect of several factors like hunting, habitat degradation. According to Prater (1971) lands broken up by mullahas and rivers with scattered bushes and thin jungle is the usual habitat of cheetal. The protected areas like Kanha National Park, Nauradehi and Bori wildlife sanctuaries are good habitats of deer and, therefore, lot of animals are found in these areas (Pandey and Kotwal, 1988).*

*Cheetal (*Axis axis*) is one of the common deer species found in Udanti Wildlife Sanctuary, besides Sambar and barking deer. Actually, cheetal can be frequently sighted throughout its range of distribution. Weight of male is about 80 kg while that of female 50 to 60 kg and height of male is about 90-100 cm and female about 60 to 80 cm (Prater, 1971). Cheetal is a very fast moving animal in deer family, which can jump easily 9 to 10 ft. high stone wall or barbed wire fencing. This animal is protected under the Wildlife (Protection) Act 1972.*

Study Site

Generally Cheetal are found in all national parks and wildlife sanctuaries in Madhya Pradesh and Chattisgarh but Udanti is unique habitat for cheetal and wild buffalo along with other wild ungulates (Omprakash & Mishra, 2000).

Udanti Wildlife Sanctuary is situated about 160 km from Raipur on Orissa border. It was notified in 1985 an area of 247.59 square km. Geographically the sanctuary is located between longitude 82° 0' to 82° 30' East and latitude 20° 01' to 20° 15' North. It falls in bio-

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geographic zone 6 E of Rodgers and Panwar (1988). The climate is monsoonic viz. Rainy (July to October), winter (November to February) and summer (March to June). The average annual rainfall is 1400 to 1600 mm most of which comes during rainy season. The minimum temperature during winter is 6⁰c and maximum in summer rises up to 43⁰c. There is a total of 18 small villages (about 4500 people) inside the sanctuary, having about 4000 domestic cattle. Primitive tribes mainly Gond, Bhunjia and Kamar are the inhabitants of the sanctuary. Cattle are dependent on forest and grasslands for their grazing obviously using the same habitat where the wild animals are also dependent. Udanti and Indravan rivers are the perennial water sources for the wild animals. Some artificial small ponds fulfil the water requirement of localized animals during summer. Tropical moist deciduous and tropical dry deciduous forest (Champion and Seth, 1968) interspersed with various open pockets of abandoned arable land (now converted into representative patches of grasslands) form the vegetation of the study area. Some important constituent species of these forests are *Shorea robusta*, *Lagerstroemia parviflora*, *Buchanania lanzan*, *Pterocarpus marsupium*, *Emblia officinalis*, *Cassia fistula*, *Cleistanthus collinus*. *Tectona grandis* is introduced to the area. *Dendrocalamus strictus* and *Chloroxylon swietenia* are also found on

hill slopes near Amli village. There are small grassland patches inside the sanctuary. These patches are situated in the valleys and plains of the sanctuary except few occurring on the plateau. The dominant grass species are *Heteropogon contortus*, *Imperata cylindrica*, *Bothrichloa odorata*, *Bothrichloa pertusa*, *Themeda quadrivalvis*, *Eragrostis* spp, *Panicum* spp, *Sacharum spontaneum* etc. *Phoenix ocaulis* forms the undergrowth in the forest on slope and plateau in the Sal forest habitat (Kotwal and Mishra, 2000).

Material and Methods

It was very difficult to locate the wild animals particularly cheetal in the forest during day time. The factors responsible for this were frequent movement of forest dwellers and cattle grazing in the sanctuary area. Three sites were selected viz. Nagesh, Karlajhar and Deojhar Amli forest beat. All the sites were kept undisturbed by making check posts and preventing movement of people and cattle grazing. Nagesh (Site I) and Karlajhar (Site II) are situated on the bank of Udanti river while the Deohar Amli (Site III) is situated near an artificial pond. All these spots are located in the central part of Sanctuary.

Direct method of observation was used to determine the pattern of diurnal activity and seasonal utilization of grassland/forest habitat by cheetal. Day observations were made with the help of

binocular (7×50 and 20×50 magnification) from a distance of 100 to 200 metres depending upon the circumstances in different seasons. These studies were carried out in two seasons viz. winter (November to February, 98-99) and summer (May-June, 99). In each season 15 observations were made in day hours and 10 in night hours at each site. Total individuals of different age and sex in the herd were observed. Cheetal were counted and grouped into male, (adult), female (adult), yearling (more than two year old) and fawn. The data are depicted in Table 1.

constituted by 3 male, 5 female, 4 yearling and 3 fawn during winter; 6 male, 10 female, 5 yearling and 6 fawn in summer month. While at site II, the herd composition comprised 4 male, 6 female, 3 yearling and 2 fawn in winter and 6 male, 8 female, 4 yearling and 3 fawn in summer season. At site III, 3 male, 7 female and 3 yearlings in winter; 5 male, 9 female, 6 yearling and 5 fawn were located in the summer season. No fawn was observed during winter at site III. The number of animals was more during summer months being at 27 at site I, 21 at site II and 25 at site III as compared to 15 each at site I & II and 13 at site III during winter. The probable

Table-1

Average number of Cheetal (*Axis axis*) of various age and sex in different season at study site I, II and III in Udanti WLS

Study Site	Season	Male	Female	Yearling	Fawn	Total
Site I Nagesh	Winter	3	5	4	3	15
	Summer	6	10	5	6	27
Site II Karlajhar	Winter	4	6	3	2	15
	Summer	6	8	4	3	21
Site III Deojhar Amli	Winter	3	7	3	-	13
	Summer	5	9	6	5	25

Observation and Discussion

Observations on group size in different sex and age of cheetal were made in all the three sites. Observed 15 and 27 cheetal at site I, 15 and 21 at site II and 13 and 25 at site III in winter and summer season respectively (Table 1). At site I, the herd of Cheetal was

reason for more numbers during summer might be open forest and restricted number of water holes.

The cheetal is the most abundant of all ungulates in the area and accounts for maximum ecological density in the sanctuary. The habitat utilization patterns of cheetal have already been

generalized as open grazing animal (Pandey *et al.* 1986). However, in Udanti Wildlife Sanctuary, the natural trend of utilization of grassland habitat was found to be affected by frequent movement of forest dwellers and grazing cattle. The diurnal activity and seasonal habitat utilization of cheetal in the study area is little different from the Indravati National Park (Pandey, 1988). The cheetal do graze just near the village and constantly remain around the forest habitat. However, during night hours, when influence and biotic impact is ceased, they move freely into grassland habitat and graze in both the seasons.

Cheetal spent about 16 hours (6-day hours and 10 night hours) during winter season and 11 hours (3 day and 8 night hours) during summer in the grassland habitat. It spent maximum hours (13 hours) of day in the forest habitat during summer. However, in winter they remained for 8 hours in the forest. During day time, maximum hours were spent for grazing/browsing in the forest habitat. However, during night, frequent movements were recorded up to sunrise. The grazing peak was observed between

19.00 to 20.00 hours and 5.00-7.00 hours. Udanti Wildlife Sanctuary has good habitat for cheetal and other wild ungulates but the biotic factors directly affect diurnal activity of cheetal. There was limited availability of surface water in some localities during summer. During rainy season the water holes increase together with fodder and so the movement of animals is widely dispersed. The biotic factors, particularly the fire, encroachments, grazing by cattle and movement of local inhabitants have caused significant impact on seasonal and diurnal activity pattern of cheetal in the study area.

Acknowledgement

We are grateful to Dr. Ram Prasad, Director, IIFM for providing me an opportunity to conduct this study. We are also thankful to Shri P.K. Mishra, APCCF, wildlife, Bhopal, who provided opportunity to work in the sanctuary. Also thanks to Shri Devashish Das, DFO wildlife, Raipur for valuable suggestions during the study period. Thanks also go to Shri D. Banerjee, ACF, and Shri T.V. Singh, RFO for the co-operation in the field.

ABSTRACT

The paper pertains to seasonal and diurnal activity and utilization pattern on grassland/forest habitat by Cheetal (*axis*) in three selected study sites of the Udanti wildlife sanctuary in summer and winter season. Utilization pattern of habitat by Cheetal was found to be affected by prevailing biotic factors like interference of forest inhabitants, grazing by domestic cattle and frequent forest fires in the wildlife sanctuary. It was observed that the Cheetal preferred to remain in forest during most

of the daytime. However, during night and early morning it prefers grazing in grassland habitat. Grazing peak of Cheetal was observed in early morning 4-6 a.m. during summer and 5 to 7 am in winter season. In present paper, seasonal pattern and diurnal activity pattern of Cheetal in forest and grassland habitat and impact of prevailing biotic factors on them are discussed.

Keywords

Habitat, utilization pattern, grazing peak, diurnal activity, Biotic Factors.

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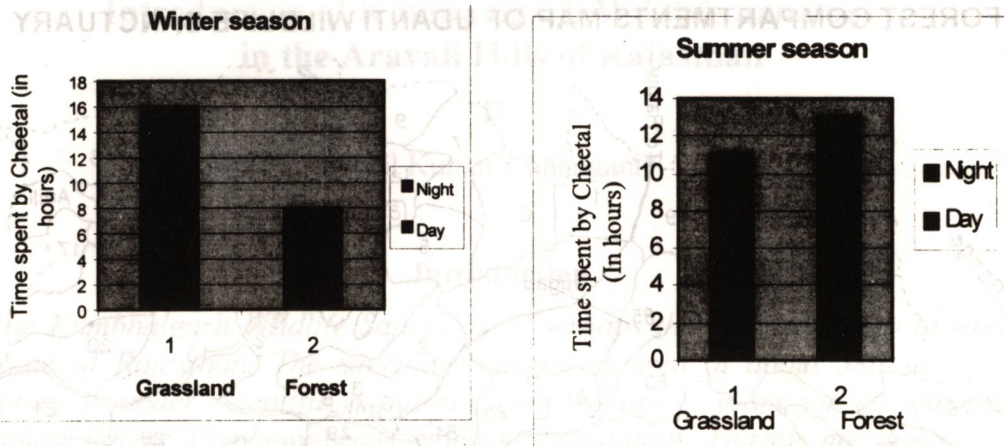


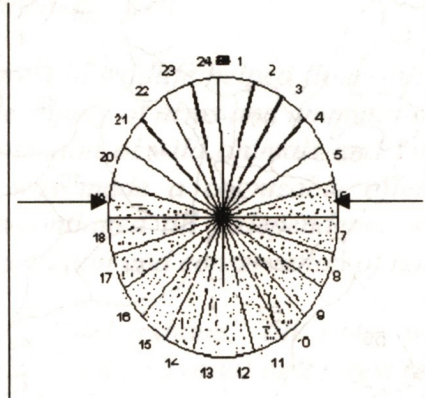
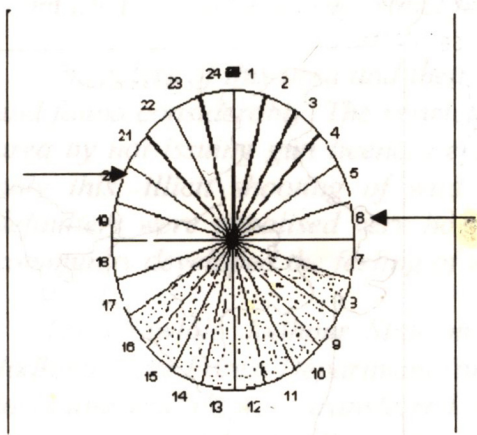
Fig 1:- Seasonal grassland / forest habitat utilization pattern of Cheetal (Axis axis) in Udanti WLS

Sun set on Feb.
12th at 18.01 hrs

Sun rise on Feb.
12th at 6.52 hrs

Sun set on May
9th at 18.37 hrs

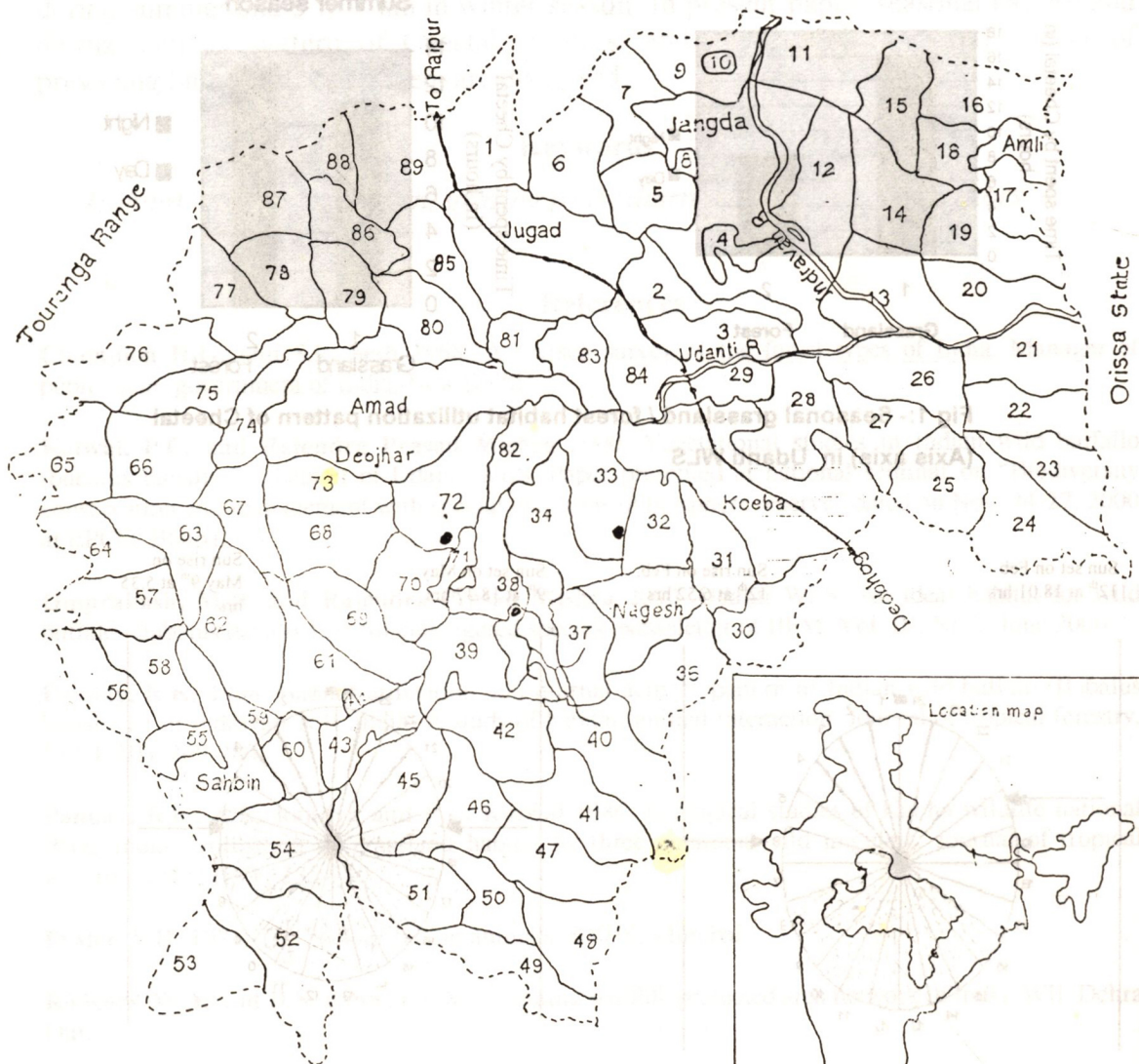
Sun rise on
May 9th at 5.35
hrs



Grassland 
Forest 

Fig 2:- Diurnal activity pattern of Cheetal (Axis axis) in Udanti WLS

FOREST COMPARTMENTS MAP OF UDANTI WILDLIFE SANCTUARY



Study site •

Grassland
Forest

Scale

5 0 Kilometers

1 : 125000

Introduction of Kumbhalgarh Wildlife Sanctuary in the Aravali Hills of Rajasthan

By

Anil Kumar Chhangani*

Introduction

*The Kumbhalgarh Wildlife Sanctuary is perhaps the best sanctuary in whole of the state of Rajasthan. The sanctuary covers an area of about 580 sq. km. The sanctuary is under scientific monitoring for the last 7 years for eco-ethology of Hanuman langur (*Semnopithecus entellus*) population. During my dawn to dusk observations of Hanuman langurs in the core area of the sanctuary, I collected data on physical, physiographical, climatic, floristic and faunistic features and worked out the changing profile of the sanctuary. The sanctuary area was earlier rich in wildlife. Tiger, panther, bear, wolf, hyaena, sambhar, chinkara, four-horned antelope, etc. were found in large numbers. But, due to degradation of forest cover and over-grazing the number of wild animals has decreased considerably. Here, tigers used to roam till 1960 but it is now extinct from the sanctuary area.*

The rulers of this area and their keen interest in wildlife helped flourish the flora and fauna considerably. The restriction on the supply of arms and ammunition in the area by not issuing gun licences ensured protection of wild animals and birds. Not only this, illicit shooting of wild animals was made a cognizable offence and defaulters were penalised very heavily. This continued till Independence when the community developed the feeling of wildlife protection and conservation of nature.

The erstwhile Jodhpur State maintained a "shikarkhana" till 1949, when the Jodhpur State Forest Department (including Kumbhalgarh area) and forest resources including wildlife were transferred to the State Forest Department in 1950. With the enactment of Wildlife (Protection) Act 1972 and declaring this area as Wildlife Sanctuary in 1971, community concept of protection and preservation of forest resources has changed. It has brought about physical change in the sanctuary but has not improved the qualitative and quantitative status of the wildlife.

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Location

Kumbhalgarh Wildlife Sanctuary (KWS) which lies in three districts of Rajasthan viz. Pali, Udaipur and Rajsamand in the south west of Aravalli hills some 200 km south of Jodhpur. This sanctuary lies between 73°2' and 73°30' East Longitude and 25°0' and 25°40' North Latitude. (Text-fig. 1)

Topography:

The KWS is situated in parts of western slopes of the Aravalli mountain ranges and the flat land adjoining it. These hills form watershed between the low lying plains of Marwar in the west and the high tableland of Mewar in the east. The Aravalli ranges run from northeast to southwest and consist of series of detached hills and ridges which rise to heights varying from 274 to 1155

metres. The highest altitude is near Kuran Ka Odain, which rises to a height of 1155 metres above the mean sea level. The slopes are gentle at the outer boundary and gentle to steep at Mewar boundary, sometimes becoming precipitous near the top.

Rainfall and Climate:

The climate of this habitat is subtropical characterised by distinct winter, summer and monsoon seasons. The summer starts from middle of March and the heat becomes intense in May-June. Hot winds called 'loo' are common in summer. The nights are pleasant. During summer the temperature rises to more than 30°C and may even rise up to 45°C, which is often characterised by hot 'loo'. It sometimes leads to failure of rains and brings about drought. The maximum temperature in

The month and year wise rainfall data recorded are shown in Table 1.

Table-1

Monthly rainfall received by Kumbhalgarh wildlife sanctuary in the years 1994-1999 (in mm).

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1994	21	0	0	0	0	101	259	384	182	0	0	0	947
1995	4	0	0	0	0	6	564	207	73	0	0	0	854
1996	2	0	0	0	12	87	212	322	24	0	0	0	659
1997	0	0	0	5	3	98	211	387	63	39	6	9	821
1998	0	0	0	0	0	69	90	97	78	119	0	0	453
1999	2	2	0	0	9	84	196	129	21	29	0	0	472

the sanctuary during the study period was 48°C . The winters present extremes of cold, which results into ground frost. Sometimes it causes considerable damage to even large trees. The mean temperature in winter is 5°C . The minimum temperature recorded during the study period was 2°C . Strong winds blow from west and are generally moderate but severe sandstorms may occur occasionally before the arrival of rains.

The monsoon may break sometimes in the middle of June but is more often delayed and commences in the middle of July and lasts upto the middle of September and occasionally continues intermittently until October. The average rainfall is 725 mm with maximum going upto 950 mm and minimum 403 mm.

Geomorphology

The main geological formations in the sanctuary are Aravalli, Raialo and Delhi quartzite rocks which form central axis of Aravallis. All these rocks are of varying metamorphic nature consisting of phyllites to fine mica, shists, argillaceous sand stone, gneiss, quartzite slates, lime stone with frequent binding of marble and granite. The whole rock system has been disturbed and is very greatly fissured, while various strata are usually repeated several times in sections.

Soil

The soil resulting from disintegration of rocks is sandy particularly where

schists and quartzite predominate. Hence it is generally very shallow, dry and of poor quality. There are many outcrops of rocks and the slopes are usually strewn with boulders like in Sumer-Kot area. The Sadri area has underlying lime stone and gneiss, the soil is much deeper and better, having a large proportion of clay like on the border of sanctuary. This factor is mainly responsible for growing superior crops in this area. On the whole however, the soil is very dry and impoverished and only hardy tree species come up in the area with their roots wedged into rock fissures.

Flora

The vegetation of KWS shows a striking difference from the plains and consists of a variety of plant taxa. The vegetation over the Aravalli hills and in the valleys appear more dense and luxuriant during monsoon months (see Plate 1). The herbaceous ground cover flourishes very well during the rainy season. The summer season is favourable for the flowering of the woody plant species in the deciduous forests. Owing to the great altitudinal variation this sanctuary encompasses different vegetation types such as dry deciduous, scrub, dry savannah forest, euphorbia scrub and dry grasslands.

The vegetation of the study site and its surroundings can be classified into (i) vegetation of hills (ii) valleys (iii) aquatic habitats and (iv) weeds (ruderals).

(i) **Vegetation of hills:** The sanctuary harbours typical vegetation of Aravalli range. As per Champion and Seth (1968) the vegetation of entire wildlife sanctuary may be considered as *Anogeissus* forest of northern tropical dry deciduous forest type. The area is covered with dense and luxurious flora, which is characteristic of the Aravallis. The vegetation is dense and diverse in content. The vegetation in the sanctuary has clear-cut altitudinal zonations starting from the base and culminating towards the top. Vegetation can be classified into top, middle and foot of the hills.

At higher altitudes of 600 m and above, *Boswellia serrata* is the main dominant species. The other species are: *Aegle marmelos*, *Lannea coromandelica*, *Mallotus philippinensis*, *Sterculia urens* and *Wrightia tinctoria*. The principal grasses on the top of hills are *Apluda mutica*, *Aristida* spp. and *Cymbopogon martinii*. The semi-stem parasite, *Dendrophthoe falcata* is also very common at 500 m and above, its host being *Boswellia serrata*. Such type of forest can be classified as *Boswellia* forest as suggested by Champion and Seth (1968). The *Anogeissus pendula* is the main dominant tree in the sanctuary particularly between base of hill to the middle around 350-600 metres above sea level. The other common tree species associated with it are: *Acacia chundra*, *A. leucopholea* and *A. senegal*, *Albizia odoratissima*, *Anogeissus latifolia*, *Bauhinia racemosa*, *Bridelia retusa*,

Butea monosperma, *Capparis grandis*, *Cassia fistula*, *Dalbergia lanceolaria*, *Ehretia aspera*, *E. laevis*, *Ficus racemosa*, *Haldina cordifolia*, *Holarrhena pubescens*, *Lannea coromandelica*, *Mitragyna parvifolia*, *Wrightia tinctoria* and *Ziziphus mauritiana*. The common shrubs in this forest are: *Annona squamosa*, *Capparis sepiaria*, *Commifora wightii*, *Dyerophytum-indicum*, *Greusia damine*, *G. flavescens*, *G. tenax*, *G. villosa*, *Helicteres isora* and *Spermadictyon suaveolens*.

Common climbers encountered here are *Abrus precatorius*, *Ampilocissus latifolia*, *Asparagus racimosus*, *Cissampelos pareira*, *Cocculus hirsutus*, *Gloriosa superba*, *Lepta denia reticulata*, *Maerua arenaria*, *Rhynchosia minima*, *Rivea hypocrateri formis* and *Wattakaka volubilis*.

The ground flora comprises herbs and under shrubs like *Abutilon ramosum*, *Acanthospermum hispidum*, *Aerva sanguinolenta*, *Anisomeles indica*, *Barleria priorits*, *Bidens biternata*, *Blainvillea acmella*, *Blumea lacera*, *Boerhavia diffusa*, *Cassia absus*, *Cardiospermum halicacabum*, *Crotolaria hirsuta*, *Dipteracanthus patutus*, *Dicliptera veticillata*, *Elytraria acaulis*, *Evolvulus alsinoides*, *Indigofera cardifolia*, *Indoneesiella echisidea*, *Ipomoea dichroa*, *I. Pes-tigridis*, *Justicia heterocarpa*, *Kickxia ramosissima*, *Lavandula bipinnata*, *Lindenbergia muraria*, *Leucas cephalotes*, *L.*

urticaefolia, *Melhania futteyporensis*, *Plumbago zeylanica*, *Sida cordata*, *S. cordifolia*, *S. ovata*, *Tephrosia purpurea*, *Tridax procumbens*, *Triumfetta pentandra*, *Drimia indica* and *Vernonia cinerascens* along with the most common grass species *Apluda mutica*. The other grass species associated with it are *Acrachne racemosa*, *Aristida adensionis*, *Brachiaria ramosa*, *Chloris quinquasclia*, *C. virgata*, *Cymbopogon martinii*, *Dichanthium annulatum*, *Digitaria ciliaris*, *Iscilema prostratum*, *Perotis hordeiformis* and *Tetrapogon tenellus*. At the foot of these hills in the sanctuary area *Anogeissus pendula*, *Ziziphus nummularia* and *A. mauritiana* are very common. The other common plants associated with these are *Acacia leucophloea*, *A. senegal*, *Bauhinia racemosa*, *Butea monosperma*, *Capparis decidua*, *Cassia auriculata*, *Dichrostachys cinerea* and *Euphorbia caducifolia*.

(ii) **Vegetation of valleys:** Valleys in the sanctuary are very rich in organic contents of soil and moisture. Therefore, the vegetation here is more dense and luxuriant as compared to hills.

Along the streams and in the valleys *Butea monosperma* is the main dominant tree species. The other tree species associated with it are *Bombax ceiba*, *Bridelia retusa*, *Cordia dichotoma*, *Cordia gharaf*, *Diospyros melanoxylon*, *D. montana*, *Emblia officinalis*, *Ficus benghalensis*, *F. racemosa*, *F. religiosa*, *Flacourtia indica*, *Holoptelia*

integrifolia, *Mallotus philippinensis*, *Phoenix sylvestris*, *Pongamia pinnata*, *Syzygium cumini*, *Tamarindus indica*, *Wrightia tomentosa* and *Ziziphus maritima*. The common shrubs associated with it are *Adhatoda zeylanica*, *Hamiltonia suaveolens*, *Kirganelia reticulata*, *Lantana camara*, *Miliusa tomentosa*, *Nerium indicum*, *Nyctanthes arbor-tristis*, *Vitex negundo* and *Woodfordia fruticosa*. Such type of forest can be classified as *Butea* forest as per Champion and Seth (1968).

The common moisture and shade loving herbaceous species are: *Euphorbia* spp., *Eclipta prostrata*, *Commelina* spp., *Oxalis corniculata*, *Phyla nodiflora*, *Trachyspermum stictocarpum* and *Verbena encelioides*. The occurrence of many species of ferns and bryophytes near moist-marshy, cool and shady places, particularly near water falls, streams and in rock crevices is common. The common ones are *Actinopteris radiata*, *Adiantum capillus veneris*, *A. incisum*, *Cheilanthes farinosa*, *Pteris vittata*, *Riccia* spp., *Funaria* spp. and *Marsilia minuta*.

(iii) **Vegetation of aquatic and marshy habitats:** The hydrophytes are very poorly represented. They generally occur in puddles, along streams and falls. The aquatic species of the sanctuary are: *Azolla pinnata*, *Chara* spp. *Hydrilla verticillata*, *Potamogeton crispus*, *P. nodosus*, *Trapa bispinosa*, *Ceratophyllum demersum* and *Vallisneria spiralis*. The other

aquatic plants seen here are *Ipomoea aquatica*, *Lemna perpusilla*, *Nymphaea nouchali* and *N. pubescens*. In puddles, streams and in river beds where some water is present *Typha angulata*, *Cyperus pangorei*, *C. rotundus* and *Scirpus littoralis* are common.

The common plants found in marshy habitats are: *Alternanthera sessilis*, *Ammannia baccifera*, *Bacopa monnieri*, *Bergia ammannioides*, *Dentella repens*, *Eclipta alba*, *Enicostema hysopifolia*, *Phyla nodiflora* and *Veronica-anagallis aquatica*. Sedges and grasses abounding in marshy and swampy habitats are: *Bulbostylis barbata*, *Cyperus alulatus*, *C. difformis*, *C. iria*, *C. leavifatus*, *Scripus roylei*, *S. tuberosus*, *Elecharis capitata*, *Echinochloa colomum*, *Eragrostis ciliaris*, *Heteropogon contortus*, *Paspalidium flavidum* and *Polypogon monspiliensis*.

(iv) **Weeds (ruderals):** Besides the weeds of cultivated and fallow fields the common ruderals found are: *Acanthospermum hispidum*, *Amaranthus hybridus*, *Argemone mexicana*, *Calotropis procera*, *Datura inoxia*, *Tridax procumbens* and *Xanthium strumarium*.

The common crops in the area are maize, wheat, oilseeds, sugarcane, cotton and a variety of vegetables. The common weeds of cultivated fields and irrigated lands are *Amaranthus* spp., *Chinopodium album*, *Oxalis corniculata*, *Portulaca quadrifida*, *Physalis minima*,

Solanum surratense and *Withania somnifera* (Chhangani, 2000).

Avifauna:

During this study some 155 birds species belonging to 47 families have been recorded. Increasing numbers of Grey jungle fowl (*Gallus sonneratii*) and Grey hornbill (*Tockus birostris*) are amongst the characteristic avifauna of this sanctuary.

Fauna:

The panther (*Panthera pardus*) tops the predators' list in the sanctuary (see Plate 2). The hyaena (*Hyaena hyaena*), wolf (*Canis lupus*), Jackal (*Canis aureas*), jungle cat (*Felis chaus*) and Fox (*Vulpus bengalensis*) are the other main carnivores found in the KWS.

Among herbivores Hanuman langurs (*Semnopithecus entellus*) are commonest (see Plate 3) with sambar (*Cervus unicolor*), chinkara (*Gazella gazella bennetti*), four-horned antelope (*Tetracerus quadricornis*), and blue bull (*Bosilaphus tragocamelus*), Wild boar (*Sus scrofa*), Sloth bear (*Melwasus ursinus*) and palm civet (*Paradoxorus hermaphordiatius*) are omnivorous mammals. Common mongoose (*Herpestes edwardsi*) and Ruddy mongoos (*H. smithi*) are also found. Porcupine (*Hystrix indica*) is the only large rodent of the area amongst 6 species of rodents. Rock python (*Python molurus*) is the largest amongst the 11 species of reptiles found in the area.



Plate 1 : Vegetation over the Aravalli Hills



Plate 2 : Highest predator at KWS Panther (*Panthera pardus*)



Plate 3 : Hanuman langur (*Semnopithecus entellus*) group feeding on Fruits of Samel (*Bombex ceiba*) tree



Plate 4 : World famous Ranakpur Jain Temple in the sanctuary

Eco- tourism:

There are many historic and religious places like Kumbhalgarh Fort, Ranakpur Jain Temple, Parshuram Mahadev Temple and Muchhala Mahaveer Jain Temple, etc. situated inside the sanctuary which increase the significance of the sanctuary. According to a broad estimation around 4 lakh tourists (Indian/foreigner) visit world famous Ranakpur Temple (see Plate 4).

Acknowledgement

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Crop depredation by Wild animals living in and around 'Escape areas' of Indira Gandhi Nahar in Bikaner district (Rajasthan)

By

Sanjay Madan, Prashant Bissa, R.N. Bhargava* and L.S. Rajpurohit**

Introduction

During rainy season the level of canal water increases because water is not used by farmers to irrigate their crops. This excess water is removed through escape channels and discharged to the areas. on the right side of the canal (on the west side).

Excess water through escape channels gets filled in the depression in between sand dunes nearby after flowing through these temporary channels and forms a big water pond or a lake of irregular shape. •

*In the jheel (lake) area plantations of **Acacia tortilis**, **Prosopis juliflora** are raised by forest department and many other hydrophytes also grow naturally. Some grasses and weeds are also growing in the region. Due to above changes the whole area appears like a rain forest.*

The dense vegetation provides shelter and hiding place for the animals like wild boar, blue bulls etc. during the day. They are reported to raid the crops extensively in the night in nearby crop fields.

Materials and Methods

Under the Indira Gandhi Nahar Pariyojana (IGNP) scheme earlier known as Rajasthan Nahar Pariyojana-RNP, the canal originated from "Harike barrage" (dam) in Haryana. Canal then enters in Rajasthan from Shree Ganganagar district and passes through Hanumangarh, Bikaner, Jaisalmer districts. In our study area mainly at the

escape channel of 750 R.D. of IGNP (Bikaner district), about 15-16 jheels are reportedly formed by these escape channels. These jheels vary in size from place to place, some are large and others small.

Vegetation

Distinctly scattered trees of stunted growth are found along depressions. In

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the semi-arid region the vegetation mainly consists of dwarf grasses interspersed with few characteristic desert shrubs. Permanent vegetation of the entire area is, therefore, xerophytic in character (Bhandari, 1978). In the jheel several hydrophytes are found growing. The surrounding areas of jheel is covered by *Acacia tortilis* (Babul), *Prosopis juliflora* (Kiker), *Euclyptius* sp. (Safeda), *Leptadenia pyrotechnica* (Kheemp), *Aerva persica* (Bui), *Calligonum polygondies* (Phog), *Calotropis procera* (Aak), *Capparis deciduas* (Ker) *Crotalaria burhia* (Sinia), *Lasiurus ecaudatus* (Sevan) etc. Some water grasses and weeds grow in the wet area.

Climate

Climate of this region is characterised by extremes of temperature, several drought accompanied by high wind velocity, low relative humidity, evaporation and very scanty rainfall to support any appreciable vegetation. The winters are quite cold, temperature sometimes dropping below the freezing point, while the heat during summer is intense and scorching. Maximum temperature recorded 50°C and minimum -5°C . However, the mean daily maximum temp. during summer is 40°C and 22°C - 28°C during winter. The humidity varies from 36 to 50 percent. Dust storms, locally known as "Andhi" are quite

frequent and may be in hot weather as strong as 136 km p.h.

Methods

To assess the crop damage by wild animals, we have used following ways:

1. Questionnaire from the farmers and local people living near the lake area (escape area).
2. By vehicle survey of the area; and
3. Survey on foot.

And further to be more authentic we have used camera, binocular, spot light, measuring tape, camps etc. in field study.

Observations & Results

We found large number of mammals living in these escape areas which raid crop fields nearby. For example wild boars, blue bull, chinkara, feral cows, rabbits etc. are common.

Wild boar : The long grass of Sarkanda growing in jheel area provides very good shelter to wild boar for hiding in day time. In night the boars move towards the crops fields nearby and raid the crops severely.

The boar likes groundnut very much. The villagers report that the smell of groundnut crop attracts the wild boars form 20-25 km. A group of 15-17 wild boars can completely ravage the

groundnut crop growing over 6 Bighas in one night, causing a loss of about Rs. 50000 in a single night. Other preferred crops by wild boars are gram, wheat, millets etc.

The farmer Rameshwar Lal Prajapat (near 750 R.D.) grew Cicer crop near his Dhani over some bighas. He didn't guard his field for two nights and only 70 kg gram could be harvested and the remaining was completely damaged by wild boars.

In wheat crop the wild boars chew the soft upper part of immature wheat plants and suck the juice throwing away the remaining husk. Wild boars also damage the cucumber and other vegetable crops. Villagers avoid growing the groundnut crop due to fear of wild boars raiding.

They protect their fields from wild boar by guarding the fields whole night, with the help of light and noise. And when the number of wild boars are much more in the region the farmers call the tribal poachers like Bavri, Jogi, Shilajit Wale for help. They kill the wild boars by a bomb, which are made by improvised explosive material like potash.

The blue bull : Number of blue bulls is increasing throughout the Indira Gandhi Canal area. Specially in the escape channel they are in abundance. They rest during day time in the jheel area. In the night they approach nearby crop fields and raid them. The blue bulls

damage the growing crops like Jwar, Bajra, Wheat, Mustard, Narma, Cotton, Cicer, Gwar, Moth, Cucumber spp. and vegetables. Cotton balls are specially preferred by blue bull. It is very difficult to stop them from raiding the crops as they can jump even 6-7 feet high stone or wire fence (Rajpurohit 1988, Goyal, 1999).

Chinkara: Chinkara is the state animal of Rajasthan. It is enlisted in schedule I of Wildlife (Protection) Act 1972. The population of Chinkara in I.G.N.P. escape area is very high. They raid the crops in nights as well as day time. They badly damage the growing crops. There is no natural predator of Chinkara. Population of Chinkara is controlled by poachers like Jogi, Bavri, Nayak, Bhopa and other tribals. They kill 1 or 2 Chinkara every day (reported from Amarpura village of Pugal district Bikaner).

Feral Cows: In the escape area large number of feral cows are found. The farmers say that they also raid the crop fields in the night. They live in association with blue bull. They are locally called "Ram gai". Feral cows are shy like blue bull. Their external features are very similar to domestic cows. They can also jump 5 to 6 feet height. Both male and female feral cows are found. They could be seen in the herds of 125 to 150 in Jaitsar (Sriganganagar) in forest enclosure. However, they generally live in groups of 5 to 6. There are about 500 to 600 feral cows living in 750 R.D. escape channel area.

Desert hare: Number of hares in the escape area is very high. They were also reported damaging the crops very much. Hares are generally killed by Bhopa (Nayak) tribals.

Conclusion

On the basis of the above observation of crop damage by wild animals near I.G.N.P. irrigated areas, we conclude that within such type of escape areas (Which are really very suitable habitats for wild animals) the number of wild animals is rather high. And they (herbivores) damage nearby crop fields severely. Farmers of the region lodge complaints and demand immediate relief from these mammalian crop raiders. To get rid of these crop pests Forest department should erect permanent fence

around these escape areas and declare it as bird sanctuary so that the poaching activities are controlled and also the wild animals will less frequently come towards crop fields. Further, such sites could be developed for tourists.

Acknowledgement

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ABSTRACT

The ecology of Thar Desert (Western Rajasthan) is fast changing due to availability of good quality water through the Indira Gandhi canal. The man made conducive ecological conditions created due to irrigation has not only transformed the desert grassland into an agro ecosystem but is also affecting the fauna of the region.

To remove the excess water from Indira Gandhi canal, some escape channels have been made. The big water logged area (jheel) is made for this escape channel water. Plantation of *Acacia tortilis* (Babul), *Prosopis juliflora* (Kiker) and *Eucalyptus* spp. (Safeda) are done by forest department in this region. Due to availability of water several species of migratory water birds are visiting these areas. In winter large number of birds could be observed here. Around jheel (lake) area sufficient number of mammals, like Wild boar (*Sus scrofa*), Blue bull (*Boselaphus tragocamelus*), Chikara (*Gazella gazella*), Rabbit (*Lepus nigricollis*). Porcupine (*Hystrix indica*) and Feral cows are seen and some of these mammals usually raid the crop fields nearby. These animals raid the crops in night and go away towards jheel area (escape areas) in day time. The observation shows heavy crop damage specially by blue bull, wild boar, chinkara, feral cows & rabbits in this region.

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ABSTRACT

The ecology of Thar Desert (Western Rajasthan) is fast changing due to availability of good quality water through the Indira Gandhi canal. The man made conducive ecological conditions created due to irrigation has not only transformed the desert grassland into an agro ecosystem but is also affecting the fauna of the region. To remove the excess water from Indira Gandhi canal, some escape channels have been made. The big water logged area (heel) is made for this escape channel water. Plantation of *Acacia torilis* (Babul), *Prosopis juliflora* (Kikar) and *Eucalyptus* spp. (Salada) are done by forest department in this region. Due to availability of water several species of migratory water birds are visiting these areas. In winter large number of birds could be observed here. Around heel (lake) area sufficient number of mammals like Wild boar (*Sus scrofa*), Blue bull (*Boselaphus tragocamelus*), Chinkara (*Gazella gazelle*), Rabbit (*Lepus nigricollis*), Porcupine (*Hystrix indica*) and Feral cows are seen and some of these mammals usually raid the crop fields nearby. These animals raid the crops in night and go away towards heel area (escape areas) in day time. The observation shows heavy crop damage especially by blue bull, wild boar, chinkara, feral cows & rabbits in this region.

Conservation in the erstwhile State of Dungarpur (Rajasthan)

By

Late Maharawal Lakshman Singhji *

The preservation of forests in Dungarpur could not have been possible without the active co-operation of the people living in and around the forests. These forests were one of the finest in the whole of Rajputana. The Dungarpur State Forest Department was established in 1907 and the Reserve Forests were demarcated after calling the people at various places, consulting and taking them into confidence and then the demarcation was announced in the villages concerned by beat of drums. The great famine—Chhapania—of 1900-1901 had reduced the population of Dungarpur State to one lac. This indirectly helped the establishment of the Forest Department, as the pressure of illicit cutting of timber had become light.

It was during the rule of Maharawal Vijay Singhji (1909-1918) that the foundation of the State Forest Department was laid. Enthusiastic forest guards were screened and selected. They served under the direct eye of the Ruler, who toured his State for 3½ months or more each year. The Dungarpur State had mixed forests, with teak and bamboo in abundance. There was no dearth of grasses and forest land was heavily laden

with jungle fruit such as Mahua, Ber, Timru, Karamda, Rayan and there were thousands of Mango and Jamun trees growing wild. All these trees annually bore a heavy crop of fruit. It was amazing to see the forest floor covered with abundance of fruits, no matter how many men, women, children, monkeys, wild animals and birds ate them.

There were quite a few forest villages that were exempt from payment of land revenue. These villages were situated within the reserve forest area and an equal number of villages were situated on the border of reserve forests who paid land revenue at concessional rates. The villagers of these areas were given privileges of Aam Nistar i.e. they could take out forest produce for their personal use on head loads. They could not use carts and there were no trucks then. They used in abundance bamboo, grasses, fuel, minor forest produce such as Moosali, wax, honey free of cost. They were repeatedly told that these privileges were the lifeline of their prosperity and the forest for them was Maa-Baap. It will thus be seen that the willing co-operation of the people was sought by the administration and with

* Late Maharawal Lakshman Singhji was ex-ruler of erstwhile State of Dungarpur (Rajasthan). He wrote this article in 1983.

the assistance of the people the State achieved something that according to the views of the then Political Officers was the pride of Rajputana.

The houses of the people were constructed with timber. Rehat (Persian wheels) were available at rates which were half of the normal rates. The foundation laid and the forest policy adopted at that time was pursued till 1948, when the State merged with Rajasthan. The demarcation of forests made in 1907 stood upto 1948. There was no change, but consistency with stability and the people knew where they stood vis-à-vis the administration.

The working of forests was done on coupe system on the pattern of Central Provinces. Young men were sent to the Forest Training School at Balaghat, who on being qualified were appointed Rangers. There were three Rangers and an Assistant Forest Superintendent and the Superintendent of Forests. The Assistant Forest Superintendent and Superintendent of Forests toured the forest areas by rotation for two weeks every month. For them there was no close season— not even in the rains.

The situation of wildlife in Dungarpur after the great famine-Chhappania— had become precarious. Thousands of Chinkara, Nilgai and Pigs perished. But with effective preservation in the reserve forests the wild animals steadily increased. Outside the reserve forests thousands of Chinkara, Pig and Nilgai were killed every year by the Bhil tribals, which provided them sustenance

along with fish. The Bhil children subsisted on seasonal forest fruits, so much so that only one evening meal a day before going to sleep sufficed for them.

Grass in beeds was grown. Each area was divided in four parts and grass was cut on partnership basis. 50% of the grass cut was surrendered to the Forest Department and the remaining 50% was retained by the cutter. Cattle grazing in the grass beeds and No. 2 reserve forests was permitted on scientific basis i.e. one fourth of the area was allotted for the purpose. Each bloc thus remained closed for three years out of four.

Dungarpur State was perhaps the most prolific part of Rajasthan for panthers and four horned antelope. During 1900-1948 more than six hundred panthers were shot and yet their number remained stationery. After the great famine of 1900, tigers had vanished but they reappeared in 1915 and although their number was confined to three or four they started multiplying in 1930 and their number increased to 20 to 25 between 1935 and 1949. Tiger by nature is a game killer and cattle lifter, yet the Ruler took care to preserve them. Greater care was taken in compensating people generously for the cattle killed by tigers. Each head, be it calf, bullock, cow or buffalo, killed by a tiger was compensated at a price fixed by Panchas in consultation with the owner and immediate payment was made, which invariably exceeded the price fixed by the Panchas by five to ten rupees.

Forty-fifty years of careful preservation (1907-1948) ended in complete destruction within ten years (1950-60). No trees, no bamboos, no grass and no wildlife. This could not have happened without the active connivance of rulers that be, who encouraged thousands of people of Dungarpur and Udaipur districts, and Sabarkantha and Lunawada areas in Gujarat to cut down the forests. The people were just allowed to do what they liked and the process of destruction took place under the very nose of the authorities, with their tacit but silent approval. The Adivasis have thus lost their greatest benefactor -the forests -and left them in a state of perpetual poverty and famines to cope with. The Government is at a loss to take effective measures to give relief to the people except to keep them as labourers on roads and tanks construction works.

It would not be out of place to indicate what is possible even now to improve the environmental conditions and, at the same time, ameliorate to some extent the wretched condition of the Adivasis. Bamboos can still be grown in the western part of Dungarpur District, namely in Dhamod, Malmata, Chool, Modar, Palisoda, Padar Pal, Ranijhola, Vanjoj, Ratapani, Chaklinal, Charwada, Balvania, Dakanmariya, Jhudan, Rotan and Ratanpur. These names are given to give a comprehensive idea of the area and only those portions may be earmarked for growing bamboo which may be considered feasible in the prevailing conditions. Bamboo can be grown annually like crops or grasses. It

would provide greenery and raw material for cottage industry to several thousand Bhil families. Whereas in the time of the State, one bamboo cost 1 or 2 pice, it now costs anything between 6 to 8 rupees. Bamboo products such as baskets, mats and screens, are in great demand. Bamboo production with perseverance should be possible provided the Administration is prepared to adopt a firm policy in the best interest of the poor people.

What applies to bamboo equally applies to grasses. Which must be grown. If grass is carefully stocked it will provide valuable fodder for the cattle. Its growth will preserve moisture and lift the subsoil water level. There was never any scarcity of water in this district earlier, but now this has become a chronic problem. Hand pumps can only help to a small extent. Many hand pumps are out of order and the machinery to effect repairs is unsatisfactory. Wells should be dug in river or nala beds to ensure clean water supply. This is a time tested technique. Besides, a well can easily be dug for Rs. 1,000/-. It is better to rely on these wells than hand pumps. It is widely believed that tube wells do more harm than good, as too many bore holes dug deep in to the bowels of mother earth drive the water level deeper still and bound to be injurious to plants and trees that exist on the moisture from the soil. Any experiment that takes the table of the sub soil water deeper down into the earth can only be harmful for environment and ecology of the area.

Timrus and Mahuvas must be protected. They are fruit bearing trees and the fruit is nourishing. Famine or no famine, the fruit can provide substantial diet. There are still Timru and Mahuva trees left in the district but their number is decreasing. Timrus are being cut mercilessly. This should stop. Timru leaves provide bidi leaf and bidi making can be a cottage industry. Mahuvas are being cut for the well-to-do people for house making and furniture. This must also stop. Mahuva and Timru are essential elements of nature for subsistence of the Adivasis and deserve strict protection. It will be suicidal to put the axe on these two essential trees, which have been giving subsistence to the Adivasis from times immemorial.

Sri Samar Singhji adds:-

Here, I may mention that it is not well known at least now that one notable achievement of the Late Maharawal Saheb was the successful manner in which he re-introduced the Tiger in the erstwhile Dungarpur State during the late 30s and early 40s of the last century. The Tiger had virtually disappeared in that area in the early years of the century, following the terrible famine years at that time, which wiped out a lot of domestic as well as wild animals. The Tiger was a major casualty. After he became the Ruler of Dungarpur and settled down, Maharawal Lakshman Singhji took great pains to revive the forests and wildlife in the state and the success achieved by him is mentioned in the article of Col. Guman Singhji. (Cheetal Vol. 40 Nos 1&2, Page 75-77) It is noteworthy that by 1947-48 there were about 25 Tigers (and around 200 Panthers) in Dungarpur State. Sadly, in the next few years these were again wiped out due to other reasons.

It must be remembered that thousands of Adivasis find it difficult to have two square meals in 24 hours today. The daily wage of the few Adivasis employed on famine relief is inadequate to purchase sufficient maize to go round a family of 3 or 4. Prices have shot up, the balance of nature has been upset and the recurring famines in the last 10 years or more have added to the hardships and sufferings of the poor people.

After the havoc that has been caused, forests can never be revived in their old form. It is, however, most desirable to grow forests wherever possible.

A Study of Flowering and Fruiting in Free-growing Trees

By

Prosenjit Das Gupta*

Introduction

There are a wide variety of flowering and fruiting trees in different forests of India. Some of the flowers like *Mahua* (*Madhuca indica*) and drum sticks (*Moringa oleifera*) are eaten by humans, animals and birds. Others like the bel fruit (*Aegle marmelos*) are eaten by humans and animals. Thus the availability of fruiting and flowering trees in the forests is highly important to animals and birds, as well as to the humans living in and around these forests.

The author, therefore, undertook a study of flowering and fruiting seasons of some of the common trees and made rough estimates of the quantum availability of flowers/ fruits in different seasons and the likely levels of nutrition that may be derived from them. This gives some indication of the nutrition available to birds and animals from these flowers and fruits.

Methodology.

Since it was not possible, owing to other pre-occupations, for the author to work in any forest area for this study, the flowering and fruiting of freely growing trees in certain localities in the city of Calcutta were taken up. Calcutta is fortunate in still having a good number of large and small areas in parks and compounds with free growing trees. Many of the major roads have substantial grass verges with large fruiting and flowering trees. Again many of such trees are of the *Ficus* species, such as *Ficus bengalensis*, *F. religiosa*,

F. infectoria, *F. lusescens* etc. which are much patronized by birds such as bulbuls, mynahs, barbets, yellow-legged green pigeon, crow, tailor bird, rose-ringed parakeet, tree pie, etc. etc. There are also a good number of semal (*Bombax malabaricum*), and wild growing jilon (*Trema orientalis*), and some madar (*Erythrina india*) and palas (*Butea monosperma*) freely growing in parks and private compounds. These also provide food for birds when in season.

As I had to go along a fixed route each day to office, it was thought that it

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would be convenient to study quite a number of such trees along this route. This meant that the trees selected for this purpose could be checked almost on a daily basis for commencement of flowering, fruiting, approximate numbers of fruits and the cessation of flowering/fruiting. This was regularly done over a period of three-years from September 1997 to August 2000 and entries were regularly made as and when these changes occurred in a PC with Lotus and subsequently on an Excel programme.

The tree species selected, their locations, and the dates on which flowering/ fruiting respectively commenced and ceased are given in the annexure. The number of days flowers or fruits were available are given alongside each tree. Eye estimates at close range, about 10 to 15 feet, were made of the clusters of fruits and flowers, the approximate number per cluster, their spacing, etc. A very approximate estimate was then made of the total quantum of fruit available per tree by taking the canopy of each tree as roughly as hemisphere of a given radius.

Finally, the nutritional levels of the fruits and seeds were taken from "Nutritive Value of India Foods" by C. Gopalan, B.V. Rama Shastri and S.C. Balasubramanian (National Institute of

Nutrition, Hyderabad, 1982) and estimates of nutrition were worked out.

Discussion

A glance at the table given in the annexure shows that generally speaking the flowering and/or fruiting of these trees commenced mostly from about the end of March each year and continued upto about July, with a second fruiting in several cases in October/November. This coincides with the breeding season of many local birds such as bulbul, tailor birds and so on. Thus the parent birds could gorge themselves before the breeding and feed the softened and broken fruits to the chicks once they are hatched.

As would be seen from the table, eight *F. bengalensis* were checked over the period mentioned above and they accounted for a total 26 fruitings in this period, ranging from 20 days to 55 days (the reasons for this variation in fruiting period could not be readily ascertained but it could be linked to the ambient temperature and moisture levels). Taking the average radius of these trees at 15 feet, the surface area of each was approx. $2 \times 3.142 \times 15 \text{ ft. }^2$, or a 1414 sft. Hemispherical surface. The fruits were found in bunches of average 5 fruits at intervals of about 1ft. $\times$ 1 ft. It was found that another lot of fruits were about 3 feet below or $2 \times 3.142 \times 12 \text{ ft. }^2$

or 905 sft. $\times$ 5 fruits, or a further 4525 fruits. Thus each tree for each fruiting running to about 21 days on average, provided an estimated 11595 fruits. C. Gopalan and others (as above) have shown the nutrition levels of the fruits of *F. bengalensis* at; protein 0.5 gm fat 2.0 gm., carbohydrates 11.8 gms, energy 116 Kcal, calcium 16 mg. and phosphorous 36 mg. (all per 100 gm. of fruit).

A similar calculation was made for *F. religiosa* in the two locations, which were checked. These two trees accounted for 10 fruitings over the study period, ranging from 20 to 62 days. While the average radius of the trees was about 15 feet, the fruits were not in bunches but were strung out along stalks about 3 feet long. Thus the estimate of fruits for each occasion may be found from 2×3.142 (15-12) ft. 2×3 ft., or 1527 cft. The stalks were spaced approx $1 \times 1 \times 1$ ft. apart or there were about 1527 stalks per tree. Each stalk had an estimated 144 fruits, or each tree had approx 219888 fruits each time. Gopalan and others have shown the nutritional value of the *F. religiosa* fruit (again per 100 gms.) at, protein 0.7 gm., fat 0.5 gm., carbohydrate 11.1 gm., energy 52 Kcal., calcium 10 mg. and phosphorous 12 mg.

Only one mahua or *Madhuca indica* tree was observed during the period and

this had three flowerings, ranging from 21 to 27 days. The flowers appear in drupes of 10 to 12 and are closely spread out on a tree, spaced like in the *F. bengalensis*. The numbers, therefore, for a similar sized tree would be twice as many as for a *F. bengalensis*. The nutritional value of the mahua flower has been given by Gopalan and others (per 100 gm. basis) at protein 4.4 gms., fat 0.6 gm., carbohydrate 72 gm., energy 311 Kcal., calcium 140 mg., and phosphorous 140 mg.

Two trees of *F. racemosa* were observed and these had eleven fruitings during the period, ranging from 33 to 69 days. One tree of *F. luscens* was seen and this fruited four times during the study period ranging from 16 to 72 days at a time. No data was immediately available about the nutritional levels of their fruits; but it could be taken as similar to *F. bengalensis* for the former and to *F. religiosa* for the latter, according to the size of the fruits. Fruits of *F. racemosa* occur as inflorescence along the trunk and branches and in *F. luscens*, similar to *F. bengalensis*, although the fruits are smaller.

Flowers of *Butea monosperma*, *Bombax malabaricum* and of *Erithryna indica* provide nectar, and also nutrition in the form of the stamen, pollen, etc. No data was readily available as to the nutritional value of these flowers. But as

any visitor to Indian forests must have seen, both birds and deer throng to the flowering trees. One jilon (*Trema orientalis*) tree was observed during the study period, which had three fruitings, each of about 50 days. The fruits of *Trema orientalis* appear as miniscule berries of about 2 mm. dia. and there could be $12-15 \times 11-12 \times \frac{3}{4}$ pairs of fruits per tree during the fruiting. They are the favourite for barbets, myna, bulbuls, etc. in suburban and scrubby forest areas. However, nutritional values for their fruits are lacking.

Conclusions:

This study reveals that—

- (1) Commonly growing *Ficus* species together with other species like *Madhuca indica*, *Bombax malabaricum*, *Ertithryna* and the *Trema orientalis* can provide considerable inputs to bird populations in terms of duration of food availability and package of nutrition and energy;
- (2) It is possible to provide for viable populations of woodland birds, especially fruit eating birds, given a

minimum number of fruiting/flowering trees in a forest or woodland area; the “carrying capacity” in terms of both nutrition and nesting sites, etc. would obviously depend on the number of such fruiting/flowering trees per acre/hectare;

- (3) Planting of these species, in relative preference to other species like *Anthocephalus cadamba*, *Bauhinia*, *Polyalthia* spp., etc during “vana-mahotsava” can help better to repopulate city and suburban areas with birds like the barbet, myna, bulbul, oriole, parakeet, yellow-legged green pigeons and other fruit/flower eating birds; nectarine and insectivorous birds like sunbirds, drongo, flycatchers, may be expected to follow.
- (4) Some further studies are required in establishing the nutritional value of nectars, pollens, seeds of some other commonly occurring woodland trees, and their relative preference by fruit-eating birds.

Annexure to Article by Prosenjit Das Gupta for BNHS Journal

Tree	Location	Flower	Fruit
<i>Erythrina indica</i>	SN Pandit Hosptial wall (broken in storm)	20/2-16/3/98 03/03-05/04/99	17/3-7/4/98
<i>Erith. indica</i>	Woodburn Park	15/03-05/04/2000	(Broken in storm)
<i>Ficus bengalensis</i>	Lady Rogers wall		22/12/97-16/1/98 20/5-22/06/98 20/8-14/09/98 16/04-20/5/99 1-05-10/06/2000
<i>Madhuca indica</i>	SN Pandit Hospital wall	16/3-7/4/98 20/03-09/04/99 10/03-05/04/2000	14/4-05/05/98 12/04-10/05/99 18/04-28/04/2000
<i>Ficus bengal. (large)</i>	Opp. Post Office (a)		5/9-22/9/97 14/05-29/05/99 03/09-10/10/1999 19/05-15/06/2000
<i>Ficus bengal. (small)</i>	Opp. Post Office (b)		05/04-10/06/98 12/09-6/10/98 26/04-15/05/99 15/9-20/10/97 24/4-8/06/98 14/09-06/10/98 03/5-10/06/99 23/08-19/09/1999
<i>Ficus Bengal.</i>	Lee Road (opp. SNPH)		20/06-30/07/98 29/10-30/11/98 cream sheath fall 27/04-12/05/99
<i>Ficus lucescens</i>	No. 36-Lee Court		16/5-15/07/98 30/10-30/11/98 26/04-15/05/99 green 09/08-03/09/99 03/05-10/06/2000
<i>Ficus bengal</i>	Neal/tiffin shop		05/9-29/09/97 20/06-10/07/98 16/08-16/09/98 16/04-10/05/99 green 09/08-03/09/99 03/05-10/06/2000
<i>Ficus Bengal.</i>	Opp Shears		15/10-28/11/98 10/05-07/06/99
<i>Ficus bengalensis</i>	Tollygunj Tram Depot		17/4/98/10/06/98 19/05-12/06/2000

<i>Ficus bengalensis</i>	Tollygunj CTC depot	1/7/98-29/07/98
<i>Ficus racemosa</i>	Tolly Metro south	22/10-24/11/98
		05/02-10/03/99
		05/07-18/08/99
		14/03-07/04/2000
		17/05-23/06/2000
<i>Ficus hispida</i>	Tolly Club-NE corner	15/10-21/11/98
<i>Ficus religiosa</i>	Bansdroni Fire brigade	10/06-12/07/98
		07/02-23/02/99
		19/04-20/05/99
<i>Ficus racemosa</i>	Bhawanipur PS	09/04-12/05/98
		12/06-05/08/98
		04/01-05/02/99
		07/07-23/08/99
		13/03-17/04/2000
		08/05-20/06/2000
<i>Bom. malabaricum</i>	CR Cancer Hosp.	05/02/99-10/03/99
<i>Butea monosperma</i>	Ray Str-Elgin corner	27/03-18/04/98
		15/03-10/04/99
		12/03-04/04/2000

Garden Birds of Dungarpur– A Tribal Town in The Aravallies (S. Rajasthan)

By

M.M. Saxena*

Having been transferred from the dry-hot desert climate of Bikaner (NW Rajasthan) to Dungarpur- a town amidst deciduous forests in the Aravalli ranges of South Rajasthan was altogether a different experience to me as an environmental biologist. Having devoted over two decades of research in the field of desert ecology, more particularly desert hydrobiology, I was highly fascinated by the richness of avian fauna in this hilly region, which prompted me to study its diversity and ecology on which I learnt that hardly any information was available. I made year-round observations on the birds in the gardens, water bodies, forests and cultivations. Present account deals only with the garden birds, although an elaborate checklist is being prepared and processed for publication separately.

Observations were made with the help of binoculars and telescope. Identifications were made following Ali & Ripley (1983). The study sites mainly included gardens of Government College, Nanabhai Park, Fatehgarhi and Syntex Staff Colony.

The garden birds were represented by 39 species as shown in Table 1. Some specific observations were as below:-

Blackwinged Stilts and Redwattled Lapwing were recorded close to waterlogged areas. The latter bird was at times seen quarreling with stilts and robins with its characteristic high-pitched calls. Roseringed Parakeet were seen on tall trees, in their hollows; and in holes in the walls of buildings. While Koel visited a variety of vegetations, Crow-Pheasant spent much of the time in bushes and hedges.

Spotted owlet, Common Grey Hornbill and Indian Tree Pie were rare but magnificent sightings; and these were seen on the top branches of tall trees.

Green Bee-Eater, Black Drongo and Redvented Bulbul were abundant, particularly during late winter season. As much as, Black Drongo were not hesitant even to enter households. Like wise House Crow and Jungle Crow, Common Myna and Brahminy Myna were seen on tree, bushes and also close

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to human habitations, often searching for their meals in domestic garbage. Chats, warblers, babblers, robins, pipits, wagtails and sunbirds, in particular, enjoyed bushes and hedges.

Blackwinged Kite, Indian Roller, Whitebreasted Kingfisher, Redbacked Shrike and Grey Shrike were seen singly

perching on electric wires and taller trees.

The greatest variety of avian fauna was witnessed over winter season. The richest fauna and its highest activity was evident over the period an hour after sunrise and before sunset.

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Table 1. Garden birds of Dungarpur (S. Rajasthan)

Family and Common name

FAMILY: RECURVIROSTRIDAE

Blackwinged Stilt

FAMILY: CHARADRIIDAE

Redwattled Lapwing

FAMILY: COLUMBIDAE

Blue Rock Pigeon

Indian Ring Dove

FAMILY: PSITTACIDAE

Roseringed Parakeet

FAMILY: CUCULIDAE

Koel

Crow-Pheasant or Coucal

FAMILY: STRIGIDAE

Spotted Owlet

FAMILY: APODIDAE

House Swift

FAMILY: ALCEDIMIDAE

Whitebreasted Kingfisher

FAMILY: MEROPIDAE

Green Bee-Eater

FAMILY: CORACIIDAE

Indian Roller

Scientific Name

Himantopus himantopus

Vanellus indicus

Columba livia

Streptopelia decaocto

Psittacula krameri

Eudynamis scolopacea

Centropus sinensis

Athene brama

Apus affinis

Halcyon smyrnensis

Merops orientalis

Coracias benghalensis

FAMILY: LANIIDAE

Redbacked Shrike

Lanius collurio

Grey Shrike

Lanius excubitor

Common Wood Shrike

Tephrodornis virgatus

FAMILY: BUCEROTIDAE

Common Grey Hornbill

Tockus birostris

FAMILY: DICRURIDAE

Black Drongo or King Crow

Dicrurus adsimilis

FAMILY: STRUNIDAE

Common Myna

Acridotheres tristis

Blackheaded or Brahminy Myna

Sturnus pagodarum

FAMILY: CORVIDAE

House Crow

Corvus splendens

Jungle Crow

Corvus macrorhynchos

Indian Tree Pie

Dendrocitta vagabunda

FAMILY: PYCNONOTIDAE

Redvented Bulbul

Pycnonotus cafer

FAMILY: MUSCICAPIDAE

Rufous Chat

Erythropygia galactotes

Brown Rock Chat

Ceromela fusca

Plain Wren-Warbler

Prinia subflava

Large Grey Babbler

Turodes malcolmi

Indian Robin

Saxicoloides fulicata

Indian Robin (Brown-backed ssp.)

S.f. cambaiensis

Magpie Robin

Copsychus saularis

Little Pied Flycatcher

Muscicapa westermanni

FAMILY: MOTACILLIDAE

Tree Pipit

Anthus trivialis

Pied or White Wagtail

Motacilla alba dukhunensis

Grey Wagtail

Motacilla cinerea

FAMILY: NECTARINIIDAE

Purple Sunbird

Nectarinia asiatica

FAMILY: PLOCEIDAE

House Sparrow

Passer domesticus

Baya

Ploceus philippinus

FAMILY: ACCIPITRIDAE

Blackwinged Kite

Elanus caeruleus

Search for The Mountain Quail in Nepal?

By

Tej K. Shrestha*

SUMMARY

Mountain quail (Ophrysia superciliosa) a bird known only from a small number of specimens and smaller set of field observation, has long been a matter of ornithological curiosity because of its shy and elusive nature. This species has restricted itself to high mountain and dizzying passes. The mountain quails were once frequently reported by ornithologists in India. But due to loss of habitat, it is practically extinct in most of those reported areas. Recently ornithologists in India expressed their hope of finding mountain quails. This prompted an exploratory field study in the mountains of upper Karnali valley of western Nepal. According to local people Mountain quail formerly occurred in western Nepal and was popularly known as small mountain black partridge (Sano-kalotitra or Virtitra). Hunters and trappers of upper Karnali valley and Dailekh area still are optimistic about the survival of this bird. In conclusion, it is believed that the mountain quail may occur in Nepal and possibly in quite a few numbers. The search will be continued in unexplored possible habitats of steep hills and rocky grasslands, where camouflaging makes the birds practically invisible. Therefore, a long term purposeful quest should be prompted in search of this ornithological question mark in western Nepal.

Introduction

Scientific information concerning the Mountain Quail (*Ophrysia superciliosa*) is lacking after it was last shot in 1876 in the slopes of Sherkadanda above Nainital. However, burning desire to discover this bird remained in the minds of naturalists, ornithologists and explorers. The main aim of the present paper is to present ecological data of the habitat of the species in Nepal in order to advance our knowledge about past distribution and possibility of rediscovering this long cherished elusive species.

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Study Area

Lying in midhills of far western Nepal the Upper Karnali valley is characterized by steep hilly forest with high grassy vegetation and patches of bamboos. The Darchula and Dailek region lying between 1,500–3,500 m altitude was also surveyed. This area was explored for long-term study. Besides these hilly areas of Annapurna, Dhaulagiri particularly lying between Dana, Marpha, Tukche, Lete and upper Modi Khola valley were also surveyed.

Cover requirement of the mountain quail according to the literature sources are primarily hilly forest and windy pass flanked by grasslands. Ideal ranges however, appear to be rocky terrace containing about equal proportion of hill forest, grassland around cultivated crops and ungrazed grassland and rocky bushland.

Steep slopes frequented by rocky terrace exposed to sun and crags and cliffs facing south were also surveyed. Many ridge and spurs of mountains lying in the foothills of lesser Himalayas were surveyed. Many pheasant such as Kalij, Cheer, Koklas were found thriving well. This area was also explored for mountain quail. Many adjacent areas overgrazed by sheep, goat and cattle were not used for study purpose.

The steep cropland with plenty of weedy alpine grass, seeds, grains shoots of bamboo, millets which are liked by other partridge and quails, was also explored.

Besides the deep gorge section of Kaligandaki near Sikha, Ghasa, Marpha, Dana and Tatopani of western Nepal inhabited by Chukor partridge and Hill partridge were explored. People of the area were interviewed and their knowledge about red-billed and red-legged birds were extrapolated.

The survey works were conducted in early spring, monsoon, autumn and cold winter days of year 1999-2001. Field data about possible habitat came from a small scale survey. It would be interesting to embark a longer study to check in Nepal whether these observations are typical and realistic.

Methods

The explorations of mountain quail in all possible areas were made by walking, waiting noiseless and motionless. Every dropped feather of birds, and faecal matter were collected. Bird sounds, vocalizations were taped out. Every other partridges and quails biocoenotically related to mountain quail were photographed. The topographic feature of surveyed area was photographed. The upper Karnali loop, Doti, Dailekh, Khaptad are found to be potential areas for further exploration.

To explore steep inaccessible area well-trained hunting dogs (Sikari Kukur) were used. Native hunters, trappers were used and involved in fieldwork. Besides that headmen of villages, witch doctors were interviewed, photographs and drawings were displayed to them so as to gain knowledge about whereabouts of the bird and sighting experience.

Habitat information about the mountain quail was collected from literature. Morphometrics and site specific data were compiled from the collected specimens at Tring Zoological Museum.

Adjoining Indian frontiers such as Dehradun, Pithoragarh, Nainital, Jhulaghat, Garhwal region were visited to have an idea about structure and composition of habitat of the mountain quail. The possible habitat of the mountain quail lies recorded in the forest of western Nepal, Dhaulagiri zone, Seti zone, Karnali zone, Mahakali zone etc.

1. The natural habitat of the mountain quail according to literature is forested steep hills covered with high jungle grasses with patches of thin bamboos. Most of the Mountain quail specimens were taken in past from Mussoorie and Nainital with altitude 1,000 to 3,500 m. These two places are separated hardly by a distance of 185 km.

Results

The mountain quail (*Ophrysia spercilliosa*, J.E. Gray) was last seen in Nainital in 1876. Nothing more was heard of this bird for centuries. Dr. Salim Ali also took great interest in search of this bird. Rieger and Walzthony (1990) undertook field investigation and contacted proponents who believed on the existence of Mountain quail in India (Dang 1988 and WWF India). Ripley (1952) mentions a local name from Dailekh district to be *Sano Kalo Titra* in Nepal and he attributed this name to be more descriptive. The translation of this name into Nepali is "small black partridge". I made inquiries from villagers in Dailekh and was told another name "Vir titra". Local hunters reported that at least these kinds of birds having red bill and legs exist in Dailekh district along inaccessible steep hill slopes. I showed them drawing and photographs of mountain quails to the headmen and hunters of the village and they were positive about the existence of this bird in wild.

I followed up very closely habitat description and sight record made by ornithologists and hunters in India and looked for in the hope that Mountain quail will be propped up again if it is living. Sharp shrill produced by quails were heard in steep hill near Vakunde and Baglung— but could not identify properly the unfamiliar voice of the quails. I moved towards the source of the sound, expecting a flush of quail and failed many times.

Why is the Mountain quail so elusive? Why have not more bird watchers found it? The chief reason may be that the birds now inhabit the inaccessible steep hilly areas. Most bird watching in Nepal is usually carried out in forest, foothills, ravines where there are good trail and accommodation facilities. Bird watchers generally have little inclination for dry desolate grassy hills where access is poor and people are little educated. The mountain quail may also have been overlooked because it is extremely difficult to locate even when calling. The quail in general in Nepal appear to be resident rather than migratory in nature. They have feeding, breeding and wintering grounds. Possibility exists, therefore, that mountain quail may still exist in Nepal. But without more detailed observation no firm conclusion can be drawn.

Discussion

Bonaparte (1856) coined scientific name *Ophrysia superciliosa* for mountain quail. Gray 1846, described mountain quail as *Rollulus superciliosus*. Later Blyth (1967), gave new generic name to mountain quail as *Malacoturnix*. Ripley (1952) mentioned local name from Dailekh District: Sano Kalo Titra. Ripley (1952) puts mountain quail as relative of Blood pheasant (*Ithaginis*) and Spurfowl (*Galloperdix*). Ali (1977), believed that the mountain quails are closely related to Bush quail (*Perdicula*) and Blood pheasant (*Ithaginis*), due to

the virtue of stout bill and stiff bristle like feather on forehead. According to him mountain quail share all three genera *Ithaginis*, *Perdicula* and *Ophrysia*.

Habitats of the Mountain quail are well described in the literature. Most authors agree that Mountain quail favour altitudinal range 1,500 to 2,500 m covered with grass, bushes and sparse trees, mainly oak. Mountain quail hunters in past such as Mackinnon, Hutton, Carurthen described its habitat. Mackinnon describes that Mountain quail favours a grass jungle, southern slope; on the other hand Hutton describes Mountain quail favours high jungle grass... long high grass... and tall seed grass and the birds do not come out into open grass. Further, Carwithen, describes very steep, with patches of thin bamboo brush wood along eastern slope. The present investigator searched mountain quail in all these habitats in western Nepal particularly in the upper Karnali valley. He could not detect presence of the bird.

There are diverse views concerning colouring of bill, leg, plumage and sex difference of Mountain quail species displayed in Tring Zoological museum show a large variation in colouring depending on the state of preservation and age of specimens. As there are many birds with red leg and bill. It appears that mountain quail bill is coral red and not perfect red.

Acknowledgements

I would like to thank British Council for fellowship and Tring Zoological

Museum for providing skins of mountain quail for examination and authorities of Tribhuvan University for granting study leave.

Sample Biography

Mountain Quail *Ophrysia superciliosa* (Gray)

Altitudinal range: 1,600,-3,500 m.

Entire length: 25 cm.

Status and Habitat: Recorded in past form western Himalayas. If surviving to be looked for steep hills of far western Nepal. Found along grass and brush-woods on steep hills.

Field marks: A small long tailed bird resembling brown partridge, having distinct red bill and feet. This bird is sexually dimorphic. Male has black face with a white patch in front of eyes and another behind forehead and supercilium whitish, bordered above and below with black. Forecrown grayish brown and streaked with black. Wing light brown. Underparts including chin and throat black. A distinct white looping band extends from chicks. Undertail-coverts black, barred with white. Female has pinkish grey face. Eyebrow small but whitish. A broad black band on either side of the crown. Upper plumage including wings cinnamon brown broadly streaked on nape and neck with triangular black spots on back. Underparts pale vinaceous brown streaked with chestnut and black from lower throat down. Flanks and vent vermiculated with brown and black. As this species is found in steep hills it is very hard to locate breeding population and study. Generally live in pair and small parties composing up to 30 individuals. An efficient runner, very loath to fly. Spends much time feeding and scratching the ground like domestic fowl. Sometimes dig snow to expose food material buried underneath. It is a bold and tame bird, allows very good target to hunter due to its stupid fearless habit.

Food: Moss, fern, shoot, lichen.

Call: Emit short monosyllabic call.

Breeding: Not known.

Distribution: In Nepal possible habitat of this bird lies near Darchula, Dailekh (Western Nepal), steep hills of upper Karnali river valley.

Range: It is presumably endemic bird. Known from western Himalayan foothills such as Jharipani, Badraj and Banog (Mussoorie), Sherkadanda (Nainital).

Reference: Ali and Ripley 1969, Rieger and Walzthony 1990, Shafiq, Javid and Kaul, 1998.

Based on the field work and available information it can be inferred that mountain quail is still surviving in steep inaccessible hills of far western Nepal, and for discovering quail long term investigation in all possible habitats will be needed.

Potential Area Surveyed

Annapurna fringe

Darchula Dailekh Area

Upper Karnali

Upper Modi–Kaligandaki Valley

Jumla–Jajarkot Region

Rolpa Region

Kaptad Region

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Watershed Management in Doon Valley

By

Madan Mohan Pant*

Trees Are Supporting Organisms

Of the entire God's creations including human beings, plants are the only 'life giving lives', the epitome of 'always giving divine benevolence', and supreme selfless-services, *ad infinitum*! For, only plants' leaves with their chlorophyll are capable of **photosynthesis**—the process by which poisonous gases are converted into **oxygen**—the very *Prana* of life and **carbohydrates** (food) under the influence of light. Every leaf, in fact, is a solar collector crammed full of numerous photosynthetic cells having chlorophyll, the green pigment, that absorbs all wavelengths of visible light except green. The photosynthetic cells have specialized structures known as "stomata: very tiny pores of sizes varying from 15—44 μm (millionth of a metre) in length and 11—30 μm in width, their frequency ranging from 140—656 per mm^2 in the middle portion of leaf," in different species, to allow gases exchange. The basic chemical process—**along which all life revolves**—can be

illustrated simply as:

● **Water:** $6\text{H}_2\text{O} + 6\text{CO}_2 + \text{light} + \text{Chlorophyll} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + \text{Chlorophyll} + \text{cooling due to transpiration of the excess water lost through stomata in the process}$. Plants also produce some carbon dioxide by their respiration, but this is quickly used by photosynthesis.

● Solar energy heats the surface of all structures, trees, water and land. The air in contact with the surface warms, becomes less dense than the air immediately above it, and rises until it joins an **air mass** of the same density. Warm air rises, gets oxygenated if there is green foliage, the cold oxygenated air sinks. The larger the quantum of photosynthesis, the greater the amount of cold air pressing against the ground—leading to greater circulation of oxygenated air. If there are no trees (photosynthesis) and/or water sources (lake, river, ocean, etc.) outside the buildings, the air will not move/circulate and there would be no wind

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since the temperature and pressure at any two places outside would be the same. The fans, exhausts, and air conditioners will merely circulate the hot polluted air produced by your own breath: kitchen, refrigerator, scooter, car, generator or what ever motorized gadget you have acquired to make a quality living will just become ineffective!

● **No life can exist without water.**

Water first comes to us as rain, snow, hail and dew. Rain seeps into soil, fills the wells, lakes and ponds; recharges springs and ground water and nurtures plants, fruits, seeds, and animals that we eat. **The water seepage enhances considerably in forests and tree crops. The roots— the huge arteries and veins of the tree keep piercing/poking and penetrating the soil, as if with sharp, ever growing, strong, tentacles advancing in all possible directions, deep downwards with a vicelike grip to make it spongy. The volume, thickness/depth, porosity, etc., of the sponged soil varies with the tree species, their age, and density. With age, the roots grow, laterally and vertically, in dimension and strength, often around rocks, boulders, etc., to provide faster pathways for nutrients and the rainwater. As a rule, the taller the tree, the deeper its root spread! The water trickles along the roots and drips down. Eventually, the draining rainwater reaches porous rock or gravel that rests on thick bedrock through**

which water cannot pass. Once the spaces between the rock and gravel are filled with water, the space is saturated.¹ **The irreplaceable role of plants as CO₂ repositories, purifying and circulating oxygenated air, and evapotranspiration of water leading to cooling of surrounding air mass, is thus a function of stomata in the plant leafs. Like the counting of hair in a human head, it is difficult to count the number of leaves and therefore micro sized stomata even in a branch, what to talk of the whole tree! In a 50-70 ft tall Eucalyptus tree we are thus talking of trillions and trillions of oxygen producing and air cooling stomata, inhaling poisonous gases and exhaling oxygen, nonstop 12-16 hours a day all the year round for hundreds of years! The shade, temperature moderation, improved soil productivity leading to food security, etc., are all due to leaves' photosynthetic activities! Through the unique photosynthetic role of micro-stomata cells in oxygenating the air, we perceive God's benevolence in infusing, and sustaining the very *Prana*-life in all 'lives' in this universe. For, as Julia Fletcher Carney in *Little things* says:**

*'Little drops of water, little grains of sand,
Make the mighty ocean and the pleasant land.
So the little minutes, humble they be,
Make the mighty ages of eternity'.*

1. The top of this saturated zone is called the **water table**. In most areas in India including Dehra Dun, groundwater is being pumped out faster than it being replaced by rainwater. Wells are being drilled ever deeper. In several places, despite deepening, the wells have become dry! The bedrock has been reached. There are prolonged droughts in many areas.

The entire life on Earth is, thus, sustained by oxygen molecules produced by micro-stomata of tiny leaves of plants, water produced through their roots, and food through photosynthesis!

● All life is “alive so long it breathes”. The moment it stops breathing, it becomes a dead body/carcass. In case of trees, however, the process of drying/dying is slow and prolonged! Meanwhile, even before the drying process starts, the tree becomes host to several animals: monkeys, birds, squirrels, reptiles, insects, etc., to name a few. Unless cut, uprooted and removed, the soil around the dead tree and even the stump becomes spongy and continues to buzz with teeming, ever increasing, soil *fauna* and *flora*! The dead tree and its root system continue to harvest precipitation, conserve soil, sustaining the life cycles of various animals, *ad infinitum*! “Is it any wonder that the tree is sacred in India. Or the forest a *tirth*, a place of pilgrimage, as holy as any temple” and our Forest Policy, in each of its revisions, insists on the minimum of 33.66% of land area under trees’ crown cover?” Therefore, in the Almighty’s ‘Mosaic of Web of Life’, the tree’s protection is more important, than even that of the humans, as demonstrated by the martyrdom of Amrita Devi and about 400 *tribals* from *Bishnoi* villages who were butchered nearly 300 years ago

while saving the *khejeri* (*Prosopis spicezera*) trees form the axe men of the kingdom of Jodhpur, Rajasthan. Amrita Devi and her tribe bled to death shouting, “*A chopped head is still easier to replace than a chopped tree*”.

This dying declaration of the *Bishnoi* martyrs is more relevant today as, despite the robust Forest (Conservation) Act, 1980 strengthened by the Honourable Supreme Court of India, we watch with complacency the destruction of vegetation/ trees for: insatiable human greed for land, stone quarrying, marble mining, colonization, marginal agriculture, roads, etc., that leads to water famine, drought, cycles of flood, loss of human and animal lives, homelessness and starvation, that repeats itself with increasing speed, while our glaciers retreat, our top soil is washed away and our water evaporates because there is no vegetation to retain them!

The destruction of each and every tree, in whatever guise, is indeed, deforestation, the first step towards famine, drought, pollution, fatal diseases, poverty, and an irreversible move towards the bottomless pit of underdevelopment? Tree cutting for reasons other than Silvicultural, is therefore, the foremost inimical act against the people, leading surely to an irreversible process of ecological disaster and to a bottomless pit of underdevelopment!

The Hon'ble Supreme Court's Divine Directives on Environment

Deeply concerned with increasing destruction of trees, vegetation and deforestation in all its guise leading to loss of all intangible benefits of trees/forests, Honourable Chief Justice J.S. Verma and Justice B.N. Kripal clarified the position regarding the meaning of the word "forest" and the true scope of the Forest (Conservation) Act 1980 (FCA) in their landmark judgment.

- "The FCA was enacted with a view to check further deforestation which ultimately results in ecological imbalance and, therefore, the provisions made therein for the conservation and for matters connected therewith, must apply to all forests irrespective of nature of ownership or classification thereof."

- "The word 'forest' must be understood according to its dictionary meaning. The description covers all statutorily recognized forests, whether designated as reserved, protected, or otherwise for the purpose of Section 2 (1) of the FCA. The term 'forest land', occurring in Section (2) will not only include forest as understood in the dictionary sense but also any area recorded as forest in government records irrespective of the ownership. This is how it has to be understood for the purpose of Section 2 of the Act. The provisions enacted in the FCA for the

conservation of forests and matters connected must apply clearly to all forests so understood irrespective of the ownership or classification thereof."

- "It is reasonable to assume that any State Government which has failed to appreciate the correct position in law so far, will forthwith correct its stance and take necessary remedial measures without any further delay". Each State Govt. should constitute within one month an Expert Committee to: (iii) Identify areas covered by plantation trees belonging to the Government and those belonging to private persons".

- In yet another Writ Petition², Chief Justice A.S. Anand and Justice B.N. Kripal of the Hon. SC on January 15, 1998 ordered that:

23. "Forest working shall be carried out strictly in accordance with the prescriptions of the Working plans. The Working Plans should be prepared within a period of two years. In case a Working Plan is not prepared within this time frame, future felling will remain suspended till the regular Working Plan is prepared and got approved."

- 26. "The states shall identify ecologically sensitive areas in consultation with leading institutions like the Indian Council of Forestry Research and Education, Wildlife Institute of India, North Eastern

2. (C) No. 202 of 1995. T.N. Godavarman Thirumulpad Vs. Union of India & (C) No. 171 of 1996; Environment Awareness Forum Vs., State of J&K & Ors.

Regional Institute of Science and Technology, leading NGOs, etc., and ensure that such areas are totally excluded from any kind of exploitation. The minimum extent of such areas shall be 10% of the total forest areas in the State.”

● “The basic insight of ecology is that all living things exist in interrelate systems; nothing exists in isolation. The word system is web like; to pluck one strand is to cause all to vibrate; whatever happens to one part has ramifications for all the rest. Our actions are not individual but social; they reverberate throughout the whole ecosystem”.

● 32. It is to be noticed that while the inadequacies of science have led to the ‘precautionary principle’, the said ‘precautionary principle’ in its turn, has led to the special principle of burden of proof in environmental cases where burden as to the absence of injurious effect of the actions proposed, is placed on those who want to change the status quo.

● 33. We shall next elaborate the new concept of burden of proof referred to in the Vellore case at p. 658 (1996 (5) SCC 647). In that case, Kuldeep Singh, J. stated as follows:

● “The ‘onus of proof’ is on the actor or the developer/ industrialist to show that his action is environmentally benign.”

● **Consistent with the above Orders, the Principles of Inter-generational Equity: Rights of the Future against the Present as per the 1972 Stockholm Declaration state:**

● ***“Principle 1: Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations...”***

● ***“Principle 2: The natural resources of the earth, including the air, water, lands, flora and fauna and especially representative samples of natural ecosystems, must be safeguards for the benefit of present and future generation through careful planning or management, as appropriate.”***

Phenomenal Growth in Eco- Sensitive Doon Valley

Dehradun, the capital of Uttaranchal State, had been famous for its natural sylvan beauty, salubrious climate, reputed institutes, organizations, and schools. Since the sixties, Dun valley having an area of about 2130 Km² has been urbanized at an alarmingly fast pace! Due to overexploitation of its natural resources the valley’s “unique and very fragile ecosystems with predominantly geomorphic characterization developed on incoherent

material” have degraded critically. To ensure a meticulous consideration of these intrinsic attributes so essential for the very sustainability of the basics of life: water and oxygen, at all times, the Ministry of Environment and Forest, Govt. of India took the primary responsibility of ‘imposing restrictions on all development activities in Dun Valley’ under the Environment Protection Act, 1989 as per MoEF’s Gazette notification No. 465 Dt. 28-7-89!³

● **Man-Made Problems:** For the newly created state of Uttaranchal, the alarming increase in population from 6,00,000 in 1991 to about 12,79,083 by 2001, not counting the large migratory work force, on limited land area, average length and width of the valley being 70

and 20 km respectively, colonizing every bit of land including all *nalas*, dry rivulets, roadsides, etc., deforestation, landscape alteration and disturbance to hydrological behaviour, air and water pollution, urban waste disposal and climate alteration” are serious problems to deal with.

● Due to tree cutting, “The average maximum temperature is increasing while the average minimum temperature is decreasing. The pattern of precipitation has changed. The effective rainfall in the vally has receded.” “Pollution has increased considerably and availability of enough oxygen for breathing is becoming a serious problem”.

3. To check the gross mismanagement of this Eco-sensitive area, the Union Ministry of Environment & Forests, GOI, (MoEF) notified Dehra Dun under Section 3(2)(v) of Environment Protection Act, 1986 (EPA) and rule 5(3)(d) of Environment (Protection) Rules, 1986, Published in the Gazette No. 465 Dt. 28-7-89. MoEF (Department of Environment, Forests and Wildlife) (New Delhi, the 1st February, 1989) Restricting location of industries, mining operations and other development activities in the Dun valley in Uttar Pradesh.-----

“S.O.No. 102 (E)-----Now, therefore, in exercise of the powers conferred by clause (d) of sub- rule (3) of Rule 5 of the said rules, the Central Government hereby imposes restrictions on the following activities in Dun valley, bounded on the North by Mussoorie ridge, in the North East by Lesser Himalayan range, on the South West by Shivalik ranges, river Ganga in the South East and river Yamuna in the North West, except those activities which are permitted by the Central Government for examining the environmental impacts.

Location, setting of industrial units—it has to be as per guidelines given in the annexure or guidelines as may be issued from time to time by the MoEF.

Mining—Approval of the MoEF must be obtained before starting any mining activity.

Tourism—It should as per tourism development plan (TDP), to be prepared by the state department of tourism and duly approved by the MoEF.

Grazing—As per the plan to be prepared by the state government and duly approved by the MoEF.

Land Use—As per Master Plan of development and Land Use Plan of the entire area, to be prepared by the State Government and approved by the MoEF.

● **Water Scarcity:** With the ever-increasing population water has become the scarcest resource! From a humble beginning in the early seventies, about 80% of total supply of potable domestic water in the city comes out of the stored groundwater. Due to “excessive number of tube-wells (TW) in Dehradun, and illegal drilling and installation of about 150, 5 inch diameter motorized hand pumps by hotels, Tourist resorts, Nursing Homes and businessmen, over-exploitation of ground water at an alarming rate is threatening the sustenance of ground water, while harvesting of precipitation for recharge of the springs, waterfalls, rivers and ground water is declining rapidly overtime. The future seems bleak as the resource managers are behaving as if ‘running popularity contest of some sort’ in complete disregard of the future sustainability!”

Pollution: The number of vehicles registered at Dehradun had been “increasing at an average of about 10,000 per year since 1995. By the end of the year 2000 this rate was much higher. We have, in Dehradun, the highest concentration of polluting vehicles per unit road-length amongst all the hill states in India! These ever increasing vehicles throw out several hundred cubic metres of poisonous greenhouse gases (GHEG): CO₂, CO, SO₂, suspended particle matter (SPM), NO₂, unburned hydrocarbons, black carbon (soot) and lead particles, into the atmospheric sewer: highways and other

feeder roads every hour every day all the 365 days a year! The air loaded with suspended particles and injurious gases like NO₂, SO₂, CO, and metal lead generated by the ever-increasing vehicular exhausts has become a potential cause of impairment of the nervous system of the people”.

● **Effects of Pollution:** The increasing dirt from traffic, quarrying, limestone burning, etc.; besides “cutting the incoming radiation causes various human diseases”. “The fog produced by the suspended dust particles reduces the incoming radiation and so photosynthesis resulting in the lower production of *Basmati* rice and horticultural produce”. Human exposure to different air pollutants cause and aggravate respiratory and heart diseases, cancer of lungs, sensory, neurological and behavioural effects”.

● **The Decreasing Tree Cover:** In India we are yet to devise and adopt any mechanical arrangement to clean and oxygenate the air. Vegetation especially trees are the only sources of oxygen production (in land locked areas) on the one hand and the natural sinks for air pollution on the other. Trees also filter out dust, soot, smoke and other fine particles suspended in the air. Therefore, the volume of foliage, height and density of the trees is vital for pollution control. Polluting vehicles would stay *ad infinitum* because of our

chronic “great Indian Indifference disease”, “pass the buck syndrome” and because in the words of Satyajit Ray “Indians have an infinite tolerance for decay” so we have to depend entirely on vegetation/trees for checking pollution. Unfortunately, no one seems to care, as would be evident from the following Case Study, wherein all the 14 huge Public Parks, strips with trees, are today treeless—stark naked—and the planned tree cover is near big zero. And, this has happened right in front of the World famous FRI & Colleges—Temple of Environment & Forestry, democratic efforts to save the trees not withstanding!

Epitome

● The water famine in the Doon Valley is just round the corner! May sound alarming! But those who know that even Cheerapunji [the highest rainfall areas in the world] is having water scarcity can see the impending water famine like conditions in their houses! In his article title “No water in Cherrapunji—Geography textbooks have got it all wrong” Indian Express Dated 28 04 01 J.L. Gupta records “– the place was a total disappointment; there was no water, anywhere. In fact, I learnt to my utter surprise that there is an acute shortage of water. There are no green forests, not even a blade of green grass. – ----- I drove another ten km to see the seven sisters, supposedly a combination of seven beautiful waterfalls. – On reaching the spot, I found there was not a drop of water there either.”

● The ever increasing vacuum created underground by the excessive pumping of ground water and water recharge tending almost to zero **would create** several serious geo-technical problems resulting from the excessive use of groundwater. “Over drafting occurs when people draw water out of an aquifer faster than nature can replenish it. At many places around the world over drafting has caused land subsidence/sinking. Parts of Mexico City, for instance, have subsided as much as 10 metres in the past 70 years, resulting in a host of problems in its water supply and sewerage system. Land subsidence may also occur when the water table is lowered by drainage. In the early 1970s, for example, an entire residential subdivision in Ottawa subsided when a collector sewer was constructed nearby. The subsidence seriously damaged the residents’ property”. Because of land sinking and earthquake the damage in Gujarat was so devastating?

● One shudders to think of the time, when under such conditions of *Talibanic* “cold blooded murder of ‘life giving lives’, -- environmentally the best species for Indian conditions, permitted by those who are supposed to protect the environment, and earthquake of even a much lower intensity on the Rector’s scale would create a catastrophe of serious magnitudes in the treeless Doon valley located as it is in the earthquake zone!

● Each and every tree matters for increasing the land under tree cover and for preventing the impending environmental crisis.

● Tree cover of 33.66% to provide oxygen, water, food security and to combat the looming water famine, land sinking, drought, floods, landslides, soil erosion, and other

environmental problems in the Country is critical because it will determine whether India in say 2020 will be a poverty stricken desert or a prosperous nation proud of its environment and a model of sustainable development, the leadership in IT industry not withstanding!

WATERSHED MANAGEMENT WITHIN THE HEART OF ECO-SENSITIVE DOON VALLEY

(AN ONGOING CASE STUDY)

AN ECOLOGIST'S INTERPRETATION OF THE HONOURABLE SUPREME COURT'S
ORDERS REGARDING LAN-USE : IRRESPECTIVE OF THE OWNEWSHIP,
CLASSIFICATION, ETC.

Don't let this happen
anywhere on earth



Observations on querimonious behaviour of Hanuman langur (*Presbytis entellus*) and Rhesus macaque (*Macaca mulatta*) from Kumaun Himalayas

By

B.P. Oli*

The non-human primates are intimately associated with the Indian culture since Ramayana age, and got religious protection. In Indian Himalayan Region 11 species of nonhuman primates are found in which 7 species are protected under Wildlife Protection Act (WPA) and Convention in International Trade in Endangered Species of wild flora and fauna (CITES) (Director ZSI, 1994). From Kumaun Himalayan forests 2 species have been recorded viz., Hanuman langur (*Presbytis entellus*) and Rhesus macaque (*Macaca mulatta*). In Kumaonee culture they also got good place. Locally the langur is known as 'Guni' and monkey as 'Banar'. Some sayings in Kumaun on langur and monkey are famous e.g. गुनी को लम्बो पूछड़, मुख कालो। गौता गैडा हेरि खालो॥ means the langur has long tail, black face and will feed on Gahat i.e. Horse gram (*Macrotyloma uniflorum*) seeds. गुनी झ कलेज means langur like heart, means coward hearted person, as langur are preyed upon by Leopards (*Panthera pardus*) and are extremely

restive when they are on the ground. एकुन्य गुनी झौ, एकुन्य बानर झौ, means the healthy langur or monkey who had left the troop and live lonely, means the person who eat alone, live alone. Traditionally, some people use the Hanuman langur skin on one side and Leopard skin to another side of dugdugi (Dholak) and such type of instrument has sharp and long range voice and is used on special occasions like Holi and other festivities. It is a common belief in this region that if the forest has Hanuman langurs, it shows the absence of Leopard and persons enter in the forest without any fear for fodder and fuel wood collection.

Langurs and monkeys live in their respective domains. Occasionally they mix making quarrel with each other. The Hanuman langur lives in socially organised groups, each with its own territory, headed by one or more males. The Rhesus macaque defend its own territory but subordinate groups usually avoid dominant groups, so confrontation is rare. Recently, Bhatnagar & Mathur

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(2000) have described the association of Rhesus males with a langur group, in which grooming of Rhesus males by langur female and vice-versa and mounting on langur female by Rhesus males was observed. Manohar (1989) investigated the interaction of Hanuman langur with Rhesus macaque at Jaipur. Inter-taxa association in langurs are described by many workers (Farooq 1996, Negi 1996, etc.)

Every person would like to observe the activities of non-human primates due to resemblance with the human beings. In the first week of September 1999, in nearby forest of Nainital (2300 m amsl), I was observing the activities of monkeys. For this purpose I hid myself behind the bushes at a higher place. At that site three trees of about 15-20 m in height were present, out of which one was of deodar (*Cedrus deodara*), and two were of oak (*Quercus leucotrichophora*), of which one was completely dried. All the three trees were standing at 5 m distances. Other trees were about 50 m apart from these trees. In a lush green oak tree 4 healthy mature monkeys were taking rest and were busy in searching lice from the body of each other at 11:00 a.m. Perhaps it was their own domain. A huge troop of langurs (30 in number) of all age group (bisexual group) came from eastern side and took rest for about 10 minutes on that oak tree. Due to some unknown reason, the leader of monkeys attacked a healthy langur, which lost body balance and fell down from a

height of 15 m. This sudden attack caused a sense of nervousness among langurs and resulted in dispersion of all langurs in single direction i.e., west of oak trees and they jumped on a rock (which was about 10 m in height, 30 m in length and was located just 7 m from oak trees (one by one), except two, who were leader and his female. Female langur hid herself on the top dense crown of oak tree with her new born baby. Leader langur was looking much angry and jumped with full strength on the leader monkey with a terrible voice. Fortunately, monkey leader escaped and smartly jumped on deodar tree. After one minute, all 4 monkeys came nearer to langur and positioned themselves in such a manner that langur was surrounded from all sides. In this situation he was not scared and boldly faced the monkeys. Langur was in a very angry mood. He opened his mouth many times and grinned his teeth and fastly attacked the nearby monkey who quickly jumped on deodar tree. The remaining three monkeys went on teasing the langur and tried to attack him. The langur came down on the lowermost branch of oak tree and monkeys also reached near him. After taking rest for about 2 minutes he once again jumped vigorously on them, but they all smartly jumped on deodar tree. He again failed in his mission. One reason for failure of langur to catch monkeys was due to his heavier body weight (about 15-20 kg) in comparison to monkeys (approximately 5 kg). After making 6 attempts to catch monkeys, a time came in 7th attempt,

when both the leader met face to face and the distance between them at that time was only about 1 m. In this position they loudly cried but none dared to jump on other. For staying in this face-to-face position and spending about 1 minute, langur got afraid and started moving backward, while leader monkey moved forward (towards langur). In this circumstance langur made a peculiar voice and after hearing the sound, 5 healthy langurs came from rock side towards oak tree from a distance of 30 m, for protecting their leader. Interestingly, in the mean time when they had walked 15 m, leader langur gave some body signal and some murmuring voice to that group, and strangely, after seeing and hearing they returned towards rock. Suddenly, leader langur again jumped on monkey, but failed. This process continued for 40 minutes in 5 more efforts.

After this, monkeys as well as langur got tired. The monkeys first jumped towards deodar tree and langur also left that place and slowly walked towards rock. When he was going towards the rock his female cried slowly and started coming down from top of the oak tree, but being afraid of the presence of monkeys she hid herself again in trifurcated stem of that oak tree. She sometimes was seeing towards the monkeys and sometimes towards her male. After one minute, the leader langur gave some body signal (perhaps through tail) to his troop on which one healthy colleague came and escorted the female

towards the rock. Female was perhaps ill, as she did not make normal movement like other langurs. Accompanied by colleague langur she joined the troop. Leader langur was still in angry mood and was staring at the monkeys, who were sitting on deodar tree. After 5 minutes, all monkeys got dispersed. One monkey jumped on dry tree of oak and started shaking a twig in playful mood. After some time he started peeling off the bark of that oak tree. Three Jungle crows (*Corys macrorhynchos*) were already present on that dry tree. For teasing purpose, they called other 5 crows from nearby area. Now, they all started teasing that monkey. He was angry and tried to catch the crows, but they all escaped from his reach and again returned and started teasing. Monkey repeated this for about 15 minutes and after getting tired, he moved towards some safer place. Three crows reached to the place where leader langur was present and they also started teasing him. Once again langur came in angry mood. Thus crows got frightened and they flew back to that dry tree. The langur placed himself on the highest place of the rock and looked towards his troop. He saw in all directions as well as towards monkeys, which were now frequently moving on that oak tree. The langur sat there for about 2 hours and then moved towards forest with his troop. It was observed that during this battle neither the monkeys nor the langurs ate even a single leaf. All the langurs saw this battle with great

curiosity from the rock, which ended without touching each other.

Some other observations

After death of a baby, the mother embraced and carried her dead body for few days. In one evening of December 1999, I observed a female Rhesus embracing a dead infant at Nainital. She remained in this condition for 3 days, although she took her food normally. When the dead body of the infant decomposed and gave fowl smell, some sweepers succeeded in hiding the decomposed body. For this purpose they used bread to attract mother, and when she was busy in eating, they hid the infant. When the food was finished she searched for her baby, but failed. Just after 5 minutes she saw a 15-20 days old puppy on the road. She caught hold and embraced the puppy immediately. Unfortunately by the next morning the puppy died due to wrong handling. The dead puppy remained with the monkey for 2 days. After great difficulty sweepers again succeeded in snatching the dead puppy.

When a monkey died the entire troop mourned his death for a few days. In a village of Kumaun (Sheraghat, District Almora), one Rhesus monkey was shot by a farmer in one evening. At that time all individuals dispersed. Next day the troop came at that place and remained with the dead monkey from dawn to dusk. They sat in circular position, keeping the dead in the centre. In night hours they roosted in nearby trees, while

in day time they came to that place for 3 days regularly. During these days they did not take food.

In 1997 a farmer at Khurpatal (District Nainital) was worried due to the raid of monkeys. One day he used 10 shaving blades well tied with threads, and sprinkled the common salt and bread for monkeys. When they came in a troop and started licking the salt along with bread pieces, their tongues were severely wounded, and after 18 hours, 7-8 monkeys died due to excessive bleeding.

Conclusion

Finally, it has been concluded that both the species defend their own territories without harming each other. It is clear that if the langurs were aware about the monkey territory, perhaps they would have never entered in that area. It seems that due to vegetarian habit they did not prefer to wound each other during the battle, which was fought for about one hour and ended without touching one another. The people should not use destructive methods to prevent monkeys from entering to the crop fields and nearby settlements.

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Conclusion

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Bleaching Powder Menace for Fish Fauna of Amlawa River of Western Doon Valley

By

Devi P. Uniyal*, S.N. Bahuguna**, Arun Kumar and Manisha Bahuguna***

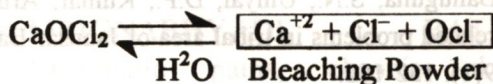
Authors are regularly doing the survey of Chakrata hills for fish faunal collection, covering the area— Kalsi, Sahiya, Seligothan, Chakrata and Deovan. During a recent survey while collecting the fish fauna from Amlawa river at Kalsi and Sahiya (Distt. Dehra Dun), strange death of a large number of fishes was noticed. These fishes were floating upside down, with breasted bellies, some were half in structure and most of their internal parts were strewn. Big sized fishes were less in number while juvenile fishes (small sized) were more with other aquatic fauna (mainly larvae). Authors collected the fish samples and examined. Some white patches were observed on the scale and it was concluded that fishes died due to the fungal disease called white spot, very common among fishes. According to villagers this mass killing of fishes was due to the toxic effect of bleaching powder thrown by villagers. This is a common practice in the river Amlawa that kills the fishes within 20-30

minutes. Bleaching powder level was found to be alarmingly high (450 mg/l) from the normal level (250 mg/l) as told by concerned officials.

According to physician if this polluted water is consumed it can cause a variety of skin diseases i.e. itching, rashes on whole body and digestive problems. Moreover, consumption of affected fish also causes disease.

Chemically bleaching powder is called Calcium chlorohypochlorite because it is mixture of hydrochloric acid and hypochlorous acid.

Chemical representation:



Chlorate ion acts as a bleaching agent. Bleaching powder is used as disinfectant and germicide especially in sterilization of drinking water, Saxena, (2000).

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This unethical method of fishing was observed by authors in Asan and Amlawa rivers of western Doon valley almost in every survey, Bahuguna et al., (2001). In other parts of Uttaranchal this method was reported in the past by Badola et al. (1977), Joshi et al. (1993), and Rautela et al. (1993). Local newspapers also reported the adverse effect caused by bleaching powder on aquatic biota (mainly fishes), water quality and whole ecosystem (Anon. 2001).

This indiscriminate killing of fishes by bleaching powder can cause rapid

depletion of fish fauna and aquatic biota of the region. Through this note authors intend to attract the attention of (State Fisheries deptt., and Wildlife deptt.) and other authorities to check this unscrupulous method of fishing. Proper law should be enforced to save the precious hill stream fish fauna of western Doon valley and to check the pollution in rivers.

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Deers and Ayurveda

By

Dr. S. Farooq, M.Sc., Ph.D., D.Sc.*

Ayurveda is a science of life and it is five thousand years old or is in vogue from time immemorial. It has made great strides in curing diseases like cancer, rickets, whooping cough etc. It comprehends herbal, mineral and animal products. Due to great diversity in climatic and topographical conditions we have very rich flora and fauna in India. The treatment in Ayurveda is economic, free from side effects and accessible to the majority of people. This has endeared Ayurveda in greater intensity throughout the world.

Stag is male deer, especially a red deer over 4-years old known as staggar. Ayurveda has made great strides in using deer products for treating diseases like. Bronchopneumonia, Pleurisy, Influenza, Phyrrohea, Rickets, Whooping cough, cardiac tonic, T.B., Weak bones (carcass), Nightfalls, enhancing memory etc. Deer products such as antlers, musk (from musk deer) are of great use in ameliorating diseases and perfumery. Perfumes are also obtained from animal origin. These occur almost exclusively as glandular secretions and enter into

commerce in their natural state. The chief among them are musk, ambergris, castor and civet. Animal perfumes are specially distinguished for their property of giving permanence to the odour of other bodies with which these are mixed. The odour they possess is also characterized by wide diffusion hardly surpassed by anything else.

Some important medicines are given below:

- (1) MRIGNABHYADI CHURNA:- For stillness of voice etc.
- (2) SRING BHASMA:- For strength, fever, regulates cough, strengthens heart, bronchopneumonia.
- (3) MRIGNABHYADI BATI:- Rheumatic pains, chronic skin diseases, diseases of the respiratory system as cough, asthma, consumption, orchitis and other enlarged glands.

I still recall that in 1972 when I accompanied my father on way to Mussoorie, my father gave me a pinch of

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Barasingha Kushta. Some magic took place. In that icy cold weather of Mussoorie when I took it, I felt instant warmth which was a very delighting experience. Due to the above facts I vividly recall a conference held in Vigyan Bhawan where a very senior Vaidya addressed the dignitaries gathered there for the imminent need for permission to use such active animal ingredients as there is ban on using wild

life animal products. There is consequent inability of making thousands of medicines where these animal products are principal ingredients. The Vaidyas without proper medicine cannot treat their patients. In allopathy all this is taken as nonscientific where calcium is calcium whether it is from the mineral source or from the stag. However, I leave this discussion open for the scholars of respective fields.

Animal products have been used in Ayurvedic medicines for curing men and animals from ancient times. They have remarkable curing power without side effects. Deers shed antlers every year. In the past forest department used to auction shed-antlers, hides and bones of dead animals every year. But due to human greed this facility was misused and people started killing wild animals, right from tiger, leopard, bear, elephant, rhinoceros down to musk deer, cheetal, sambar, mongoose etc. for animal products. This has caused irreparable damage to wildlife. We have to exercise control and restrict ourselves to the use of dead animal products. But if we do not discipline ourselves and resort to poaching and killing wild animals, the ban on killing wild animals and collection of animal products should remain.

-Editor

Khumri: A traditional Common Property Institution in Jaunsar-Bawar Himalaya

By

Varunendra Vikram Singh*

The region of Jaunsar-Bawar, Dehradun district, Uttaranchal is a remote western part of central Himalayas bordering Himachal Pradesh. Being thoroughly mountainous the territory abounds rich flora and fauna and provides a vast common property resource to its inhabitants—the Jaunsari schedule tribe. For bringing social control and regulation of sustainable use of CPRs, the Jaunsari by tradition are making use of an institution called 'Khumri'. The Khumri is headed by an influenced and elderly person called 'Sayana' and the member belongs to elderly persons of each family. The office of Sayana is hereditary and the proceedings of the panchayat are normally oral. The panchayat starts functioning soon as a complainant registers his problem, which ranges from household to community or inter-community level marital or economic disputes or other offences including over or misuse or distraction of CPRs. The Khumri is authorized to impose from simple monetary 'fines' to severest excommunication on the offenders and

from country feast to ritualistic observances and pilgrimage to the sinners. The verdicts of the Khumri though oral are still obeyed.

Though with the introduction of institutions like statutory panchayat; Van panchayat, revenue, forest and wildlife departments for rapid socio-economic development and resource preservation after independence, the role of Khumri has been curtailed but because of its integrated and indigenous approach of management its importance still continues. The Khumri institutional network provides a self contained management techniques of local origin suited to local people and CPRs, which have been totally ignored by the newer systems or institutions of management and development planning. It is now established through worldwide evidential case studies that the traditional institutions and the opinions of local people cannot be ignored, as they are the part of the social structure for which the development plans are formulated. The institution of Khumri

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and its ideology having developed within the Jaunsar specific historical, cultural and ecological contexts their strength is in their suitability for these areas and resource types. The CPRs (plants and animals) of arid zone of Jaunsar-Bawar for the sake of development can't be transferred in monsoon zone or vice versa for supportive economy.

The traditional knowledge of medicinal plants by the social groups is no longer taken lightly by medical scientists and conservationists. While learning from traditional users it is necessary for scientists, economists and development planners to overcome the narrow technical perspectives of their disciplines and become sensitive to other world views. The ecological wisdom of

the Jaunsari common property systems emphasises respect, responsibility and protection to CPRs leading to ecological balance. While implementing an ecosystem concerned plan, in which the humans are also a part, there is much to learn from the Jaunsari traditional knowledge. An ecosystem view of the Jaunsari people as regards nature relations, is far richer experience based on more informative and ultimately more sustainable.

The CPRs are living, adapting new challenges and due to that sometimes these are disappearing and reappearing in the want of an effective, exploitative and regenerative institutional system that can replace traditional management skill of Khumri.

Voice of India

By

Bulu Imam

Why is the great voice of India silent?
Its ancient soul, the murmur of its heart
Outflowing from between the crevices of rocks,
Issuing from every songbird's throat,
Rumbling within the outburst of monsoon clouds?
O where is India's secret voice gone?
In which nook and cranny is her giant mind hid?
Like tumbling zones of fire did the mantras
Sung from time immemorial, in the scriptures resound.
The ways of God in all his various forms
The Brahmins celebrated, but of which time
Is this long identity less silence which
Comes from the womb of time?
Like the placid surface of a lake
Bespeaks the myriad forms of life
Which throb, flash, flow beneath the surface.
Is India dead in pursuit of vain strivings?
Is India lost in misrepresentation of her soul?
Or is India asleep?

No, India is awake in the toil of the ploughman,
And of the housewife over the wood fire.
India is awake in the songs of innocent children;
India is awake in the restlessness of her people.
India is awake in the tears and laughter of her poor
For India's soul-wealth is her poverty,
Her spirit of quiet independence,
Her dedication to truth.
India's martyrs tread the high road to God.
Rejoice! O India lives!
In the midst of grief,
Bonded by exploiters—O India lives!
In the rewriting of the Vedas
In monumental words of stone—
Our modern cities and tombs—
For India's voice comes from deep within
The one true God who sings in every stone and tree
And lives in the heart and mind.

गोरख इमली का तीन हजार साल पुराना वृक्ष

लेख एवं फोटो : रामेश बेदी*

प्राकृतिक आवास में यह सबसे बड़े वृक्षों में से एक है। विश्व के सबसे दीर्घजीवी वृक्षों में हैं, जो लगभग छह हजार साल तक जीवित रहते हैं। आयु बढ़ने के साथ-साथ ही इनका तना क्षरित होने लगता है और बीच में से खोखला होकर जलकुण्ड के रूप में बदल जाता है, जिसमें पांच हजार लीटर पानी जमा किया जा सकता है। कभी-कभी खोखला तना छोटे आश्रय के रूप में भी प्रयोग किया जाता है। अफ्रीका में कुछ कबीले अपने प्रियजनों और वीर पुरुषों के शव कोटर में ममीकरण के लिए रख छोड़ते हैं।

प्रयागराज का वृक्ष

प्रयाग के झूसी क्षेत्र में संगम के पास गंगा के किनारे गोरखवृक्ष का एक पेड़ खड़ा है। 1988-89 के कुंभ मेले की डौक्युमेंटरी बनाने के दौरान मुझे इसे अध्ययन करने का मौका मिला था।

इसका तना खोखला था। उसके काण्ड के निचले भाग में गुफाएं बनी हुई थीं जो काण्ड के आरपार चली गई थीं। वृक्ष के गिर्द बहुत से साधुओं ने डेरा डाला हुआ था। तीन महीने तक चलने वाले कुम्भ मेले में वे यहां कल्पवास करते रहे थे।

अन्धड़ों में इस वृक्ष की बड़ी-बड़ी शाखाएं टूटती रहती हैं। इसलिए यह छोटा बन गया

है; अधिक लोगों को अपनी छत्रछाया से सुख तो नहीं दे पाता, हां, अपने आध्यात्मिक परिमण्डल में आश्रय लेने वाले श्रद्धालुओं के लिए मंगलकारी है। भले ही वे वैष्णव हों, शिवभक्त हों, तान्त्रिक हों या मुस्लिम हों।

पेड़ के बायीं तरफ एक तम्बू के नीचे करीब पन्द्रह साधु ठहरे हुए थे। उनका हाथी पास ही बंधा था। उनसे दस कदम आगे इटावा से आए छः रामभक्त साधुओं का गुप था। पांच कदम जगह छोड़कर कोलकाता के प्रसिद्ध कालीघाट मन्दिर से आए एक तान्त्रिक साधु ने छोटी सी छोलदारी में अपने कर्मकाण्ड का सामान सजाया हुआ था। इस जवान तान्त्रिक के साथ युवा चेला भी था।

साधु ने मुझे अपना नाम अनिल चन्द्र बताया था। यह अपने को नाग विषाक्त तान्त्रिक बताता था। उसका कहना था कि न जाने कितनी बार उसे सांप काट चुका है। उसकी देह नाग के विष-प्रतिरोधी तत्वों से संपृक्त है। वह सर्पदंश से इम्यून हो चुका है।

अनिल की वेश-भूषा तथा बनाव सिंगार विलक्षण और आकर्षक थी। चमकीले, गाढ़े-लाल रंग का ढीला चोगा कन्धों से झूलता हुआ टखनों को चूमता था। काली मूछ-दाढ़ी और कन्धे तथा पीठ पर बेपरवाही से गिरती हुई जेट काली लटाएं उसके रूप-यौवन को निखारती थीं।

बायें कन्धे पर भैंस के सींग से बना बिगुल लटक रहा था। तान्त्रिक पूजा में यह शंखनाद जैसा गम्भीर घोष करने के काम आता है। यह पैतीस सेण्टीमीटर लम्बा था, इसका आधार लम्बगोल था जिसकी लम्बाई दस सेण्टीमीटर और चौड़ाई पांच सेण्टीमीटर थी। सींग से बना होने से इसका नाम सिंगा था। (चित्र -1)

अनिल ने दाहिनी कलाई में गेंडे की खाल का कंगन पहन रखा था और दूसरी कलाई में गेंडे की हड्डी का। अनिल मसानी साधु था, श्मशान में धूनी लगाता था। उसके अनुमान में भारत के श्मशानों में डेरा डाले हुए मसानी साधुओं की संख्या लगभग तीन सौ होगी।

गुफाओं में चार साधु

गुफाओं के अन्दर चार साधु सोते थे। ब्राह्ममुहूर्त में स्नान आदि से निवृत्त होकर वे उनके अन्दर पदमासन में आबद्ध होकर जप, ध्यान, प्राणायाम करते थे। एक साधु जगन्नाथ घाट, हाबड़ा, कोलकता से आया था। तीन साधु फतेहपुर (उत्तर प्रदेश) के रहने वाले थे। पन्द्रह जनवरी से बीस फरवरी तक इन साधुओं का कल्पवृक्ष की गुफा में डेरा रहा था।

मिट्टी के ऊपर वृक्ष की तीन मोटी जड़ें फैल गई हैं। एक पूरब की ओर, दूसरी उत्तर की ओर तथा तीसरी दक्षिण की ओर। मैंने इनके नाप लिए थे, जो इस प्रकार हैं: दक्षिण और पूरब दिशा वाली जड़ें अठारह मीटर लम्बी तथा लगभग दो मीटर गोल हैं। उत्तर दिशा वाली जड़ की लम्बाई साढ़े चार मीटर और गोलाई डेढ़ मीटर है। (चित्र -2)

साल में दो मेले

मुस्लिम समाज में इस वृक्ष की बहुत मान्यता है। उनका विश्वास है कि अरब के

एक फकीर ने दातून करके उसे यहां गाड़ दिया था। उसी से यह पेड़ उग आया।

साल में दो बार यहां मेला भरता है। एक मेला बकर ईद के चांद की पहली तारीख से शुरू होता है। छह दिन चलता है। छह तारीख की शाम को खत्म हो जाता है। समापन का कार्यक्रम दोपहर दो-तीन बजे शुरू होता है। गंगा जल से वृक्ष को स्नान कराया जाता है। श्रद्धालु बालटियां भर-भरकर गंगा से जल लाते हैं। वृक्ष के सेवक पेड़ के ऊपर तक पानी फेंककर उसे नहलाते हैं। इस प्रक्रिया को गुसल कहते हैं। गुसल में तीन घण्टे लग जाते हैं। तब छह बजे मेला खत्म होता है।

दूसरा मेला 'तेरह तेजी के चांद का मेला' कहलाता है। यह साल के आखिरी बुध को भरता है। सुबह से शाम तक रहता है। यह बड़ा तगड़ा मेला होता है। इसमें दूर-दूर से भी लोग आते हैं। लेकिन ज्यादातर इलाहाबाद की नई झूसी और पुरानी झूसी से गरीब लोग बाल-बच्चों के साथ शामिल होते हैं।

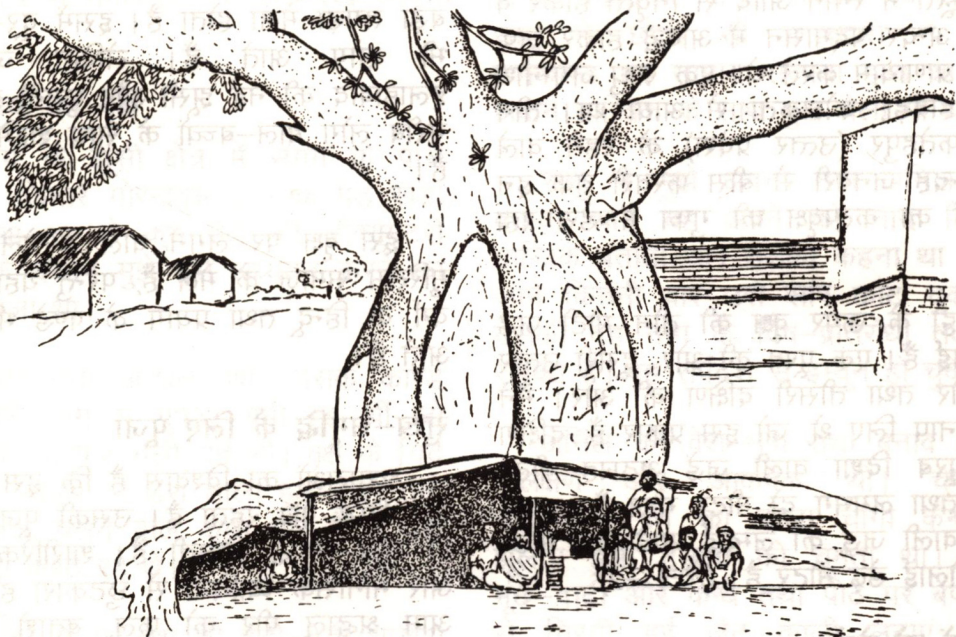
इस वृक्ष पर लगने वाले ये मेले यद्यपि मुस्लिम समाज के मेले हैं, परन्तु यहां मध्यम वर्ग के हिन्दू तथा प्रयाग के पण्डे भी नजर आते हैं।

सुख-समृद्धि के लिए पूजा

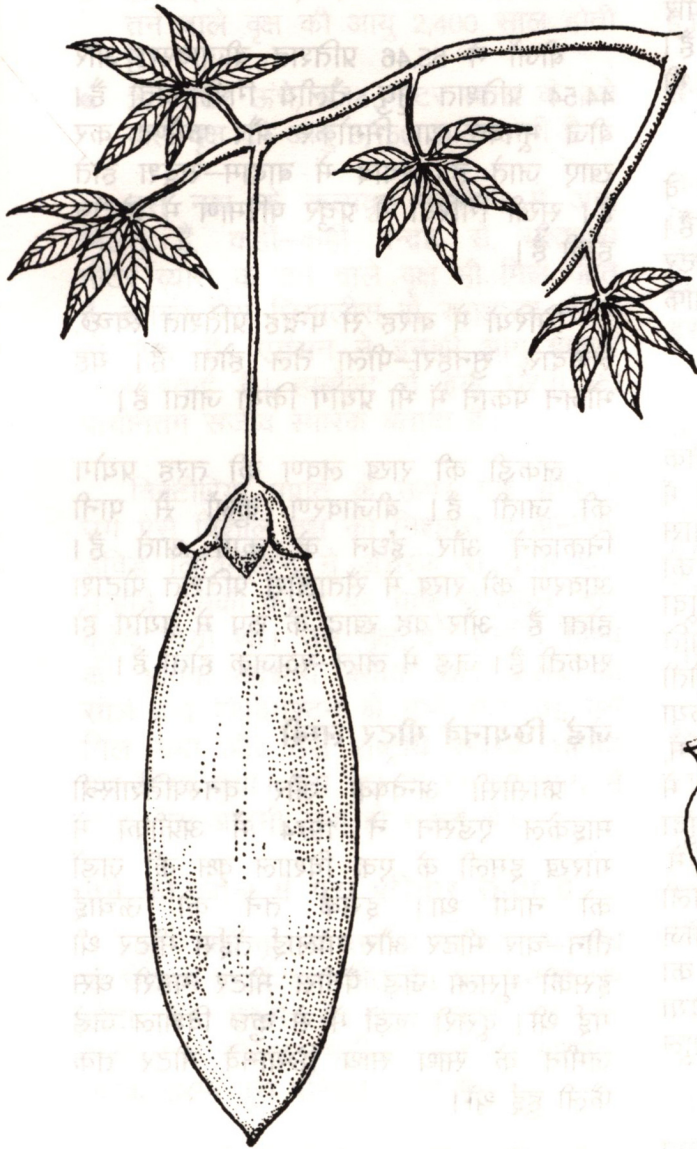
श्रद्धालुओं का विश्वास है कि इस वृक्ष में एक सिद्ध पीर रहता है। उसकी पूजा करने से सुख-समृद्धि मिलती है। शारीरिक कष्टों और मानसिक व्याधियों से छुटकारा होता है। आम श्रद्धालु पीर को फूल, बताशे, कुरमा, बेदाना, बून्दी, लड्डू, मिठाइयां, पैसे, रुपये भेंट करता है। हर मेले में तीन-चार सौ रुपये के लगभग चढ़ावा आ जाता है। मेले में



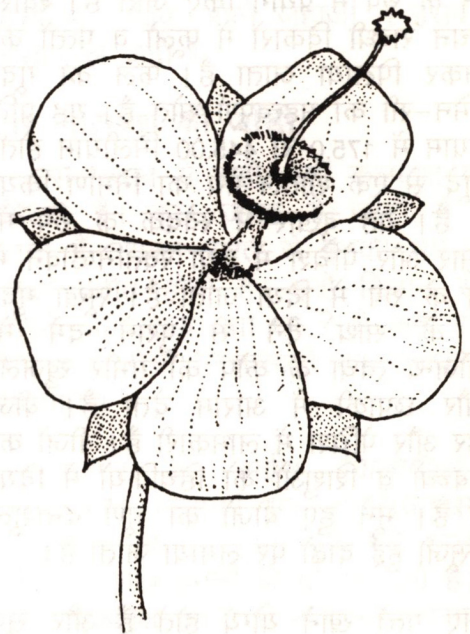
चित्र नं० १



चित्र नं० २



चित्र 3



चित्र 4

अधिकतर गरीब लोग आते हैं। इसलिए पीर की भेंट में दस, बीस या पचास पैसे के सिक्के ही दिखाई देते हैं।

झूसी के आठ-दस मुस्लिम घर सिद्ध पीर के सेवक हैं। वे चढ़ावे को बांट लेते हैं। ड्यूटी पर तैनात पुलिस के सिपाही को भी चढ़ावे में से हिस्सा दिया जाता है।

जिन लोगों की विशेष मनौती होती है वे वृक्ष के तने के चारों ओर कपड़ा लपेटते हैं। इसे साफा कहते हैं। यह करीब बीस मीटर लम्बा होता है। हर मेले में दो-ढाई सौ साफे चढ़ जाते हैं।

उपयोग

इसके पत्ते स्तम्भक, स्वेदकारी, टौनिक तथा ज्वरहर हैं। कर्णशूल और आंख दुखने में लोशन के रूप में प्रयोग किए जाते हैं। श्वास व पाचन संबंधी विकारों में फूलों व पत्तों को उबालकर पिलाया जाता है। फल का गूदा विटामिन-सी का महत्वपूर्ण स्रोत है। यह प्रति 100 ग्राम में 175.0 से 445.00 मिलीग्राम होती है। गूदे से एक शीतल पेय का निर्माण किया जाता है। यह बुखार में स्वेदक के रूप में; अतिसार और पेचिश में तथा रक्तनिष्ठीवन में औषध के रूप में दिया जाता है। सूखा गूदा पानी के साथ देने से पुराने दमे में, एलर्जीजन्य त्वचा के कोप की गंभीर खुजली में और छपाकी में आराम देता है। बीज ज्वरहर और पेचिश में लाभकारी हैं। बीजों का चूर्ण बच्चों व शिशुओं को हिचकियों में दिया जाता है। भूने हुए बीजों का चूर्ण दन्तशूल और सूजी हुई दाढ़ों पर लगाया जाता है।

नए पत्ते खाने योग्य होते हैं और सूप बनाने में सब्जी के रूप में प्रयोग किए जाते हैं। ताजे, कोमल पत्ते साग का उत्तम विकल्प हैं। कुछ स्थानों पर, वृक्ष पर कभी-कभी फूल नहीं लगने देते और हमेशा ही कोमल पत्तों के लिए छांटते रहते हैं।

फल में पैंतालीस प्रतिशत बाहरी कवच, पन्द्रह प्रतिशत गूदा और चालीस प्रतिशत बीज होते हैं। गूदा नींबू जैसे स्वाद वाला और खाने योग्य होता है। (चित्र -3)

बीजों में 55.46 प्रतिशत बीजावरण और 44.54 प्रतिशत मृदु, तैलीय गिरी होती है। बीज भूनकर या भिगोकर और फर्मेंट कर खाए जाते हैं। स्वाद में बादाम-सदृश होते हैं। सूखी गिरियों में प्रचुर परिमाण में प्रोटीन होती है।

गिरियों में बारह से पन्द्रह प्रतिशत स्वच्छ, लेसदार, सुनहरा-पीला तेल होता है। यह भोजन पकाने में भी प्रयोग किया जाता है।

लकड़ी की राख लवण की तरह प्रयोग की जाती है। बीजावरण कुओं से पानी निकालने और ईंधन के काम आते हैं। आवरण की राख में सैंतालीस प्रतिशत पोटैश होता है और वह खाद के रूप में प्रयोग हो सकती है। जड़ में लाल-रज्जक होता है।

जड़ें छियानवे मीटर लम्बी

फ्रांसीसी अन्वेषक और वनस्पतिशास्त्री माइकेल एडंसन ने 1974 में अफ्रीका में गोरख इमली के एक विशाल वृक्ष की जड़ों को नापा था। इसके तने की ऊंचाई तीन-चार मीटर और गोलाई तेईस मीटर थी इसकी मूसला जड़ पैंतीस मीटर गहरी धंस गई थी। दूसरी जड़ों में से कुछ विशाल जड़ें जमीन के साथ साथ छियानवे मीटर तक फैली हुई थीं।

एडंसन के अनुमान के अनुसार

- 8.83 मीटर ऊंचे, 1.21 मीटर व्यास के तने वाले वृक्ष की आयु 100 साल होती है।

- 17.50 मीटर ऊंचे, 4.26 मीटर व्यास के तने वाले वृक्ष की आयु 1000 साल होती है।
- 19.20 मीटर ऊंचे, 5.40 मीटर व्यास के तने वाले वृक्ष की आयु 2,400 साल होती है।
- 22 मीटर ऊंचे, 9.14 मीटर व्यास के तने वाले वृक्ष की आयु 5,150 साल होती है।

इस नाप के कल्पवृक्ष अफ्रीका में आम मिलते हैं, कहीं-कहीं पन्द्रह से सत्ताईस मीटर व्यास के तने वाले वृक्ष भी मिल जाते हैं, इनका घेरा छियालीस से सतहत्तर मीटर हो जाता है। एडंसन ने इनकी आयु हजारों साल बताई है। हम्बोल्ट ने इन्हें धरती का प्राचीनतम सजीव स्मारक बताया है।

विक्टोरिया प्रपात के ऊपर एक द्वीप में उगे ऐसे विशाल वृक्ष को मिशनरी व अन्वेषक डेविड लिविंग्स्टन ने अचरज से देखा था। उन्होंने उसकी कोटर पर चाकू से अपना नाम कुरेद दिया था। उस वृक्ष को उन्होंने विश्व का आठवां आश्चर्य बताया था। करीब सौ साल बाद लिविंग्स्टन के नाम वाला वह वृक्ष मिल गया और उसे राष्ट्रीय स्मारक घोषित कर दिया गया। इस वृक्ष के खोखले भाग में कोई तीस आदमी जमा हो सकते थे।

तने की खोल में पूरा परिवार रहता है

कुछ पक्षी वृक्ष के तने में या डाल में चोंच से छेदकर खोल बना लेते हैं। यह उनका घर होता है। इसमें वे अण्डे-बच्चे देते हैं। अफ्रीका में गोरख इमली के तने को खोखला करके उसमें पूरा परिवार रहता है।

सहारा में चलने वाले काफिलों के मार्ग में जगह-जगह ये वृक्ष मिलते हैं। इन्हें अन्दर से कुरेदकर खोखला बना लेते हैं। इसमें वर्षा का पानी जमा कर लेते हैं। एक कुण्ड में करीब पांच हजार लीटर पानी आ जाता है।

वृक्ष के मालिक मुसाफिरों को यह पानी बेचते हैं। जलकुण्ड बनाने के लिए इतना बड़ा भाग खोद लेने पर भी वृक्ष के अस्तित्व पर विपरीत प्रभाव नहीं पड़ता। वृक्ष बाकायदा उगता रहता है।

तने की खोल- जेलखाना

ऑस्ट्रेलिया के रेगिस्तान के उत्तर-पश्चिमी भाग में भी गोरख इमली (बाओबाब) का वृक्ष पाया जाता है। यहां के डर्बी शहर में दो हजार साल पुराने एक विशाल वृक्ष को शहर के जेलखाने के रूप में इस्तेमाल किया जाता था।

समुद्र में लम्बे सफर करने के कारण नाविकों को त्वचा के तथा अन्य रोग लग जाते थे। उनसे छुटकारा पाने के लिए इसके फलों का उपयोग लाभदायक होता था। इसलिए नाविक अपने जहाजों में इसके फल भरकर ले जाते थे।

नर-नारायण की जोड़ी

राजस्थान में कहीं-कहीं कल्पवृक्ष के पेड़ मिलते हैं। कुछ जगह ये जोड़ों में उगाए जाते हैं। शक्ल-सूरत से इनकी उम्र सैकड़ों साल प्रतीत होती है। इन्हें किसने रोपा ? रोपने का उद्देश्य क्या था ? ये कहां से लाए गए थे ? ऐसी जिज्ञासाओं का समाधान नहीं हो पाता।

अजमेर से बाईस किलोमीटर दूर अहमदाबाद राजमार्ग पर मांगलियावास नाम का एक गांव है। इसमें एक बड़े तालाब के किनारे गोरख इमली के दो वृक्ष उगे हैं। लोग इन्हें कल्पवृक्ष कहते हैं और नर-नारायण की जोड़ी बताते हैं। हरियाली अमावस को यहां हर साल बड़ा मेला भरता है। तीस से चालीस हजार लोग कल्पवृक्षों की पूजा करने आते हैं। वे अनेक प्रकार की मनौतियां करते हैं।

गांव वालों की मान्यता है कि पाण्डवों ने वनवासकाल में स्वर्ग से लाकर इन्हें यहां रोपा था। एक अन्य किंवदन्ती के अनुसार किसी जैन मुनि ने आकाश में विचरते हुए गन्धर्व से अपनी अलौकिक शक्ति द्वारा छीनकर इन्हें यहां लगवाया था। लोगों का विश्वास है कि दुनियां में इन वृक्षों जैसे कोई और वृक्ष नहीं हैं।

इन वृक्षों पर वर्षा ऋतु में फूल आते हैं जो सांझ के बाद रात-रात में खिलते हैं। अगले दिन सूरज उगने पर फूल फीके पड़ जाते हैं और मुरझा जाते हैं, रंग मैला हो जाता है और गिर जाते हैं। इनमें फल नहीं बन पाते। लोग कहते हैं कि इन्द्रलोक से लाया गया वृक्ष भूलोक में फल नहीं देता।

जोधपुर के पास भी कल्पवृक्ष के दो पेड़ हैं। बांसवाड़ा में दो थे, अब एक रह गया है। उत्तर प्रदेश के बाराबंकी जिले के बरोलिया गांव में उगे कल्पवृक्ष के पेड़ का नाम लोग परिजात बताते हैं। वहां अधिष्ठित बाबा के अनुसार यह इन्द्र के नन्दनवन से लाया गया था। यह छह हजार साल पुराना है तथा ऐसा वृक्ष दुनियां में और कोई नहीं है। इस वृक्ष की पूजा की जाती है।

झूसी के वृक्ष की आयु 3,200 साल

झूसी (प्रयाग) वाले पेड़ का व्यास लगभग छह मीटर है। एडंसन के हिसाब से अन्दाज लगाया जाए तो इसकी उम्र कम से कम 3,200 साल होगी।

यह वृक्ष आम नहीं मिलता। इसका रूप अजीब सा है। विलक्षणता और दुर्लभता के कारण यह रहस्यपूर्ण बन गया है। उत्तर भारत में जहां-कहीं भी ये इक्का-दुक्का पेड़ उगे हैं, उनके बारे में कोई नहीं जानता कि ये किसने उगाये और कब उगाये ? ऐसी जिज्ञासाओं को शान्त करने के लिए बुद्धिमानों

ने इन्हें स्वर्गलोक से आए वृक्ष कहना शुरू किया। कुछ जगहों पर इन्हें कल्पवृक्ष कहते हैं।

लेकिन, अधिक जगहों में इन्हें गोरख इमली, गोरख चिञ्च, विलायती इमली और खुरासानी इमली कहते हैं। अंग्रेजी में इसे बाओबाब ट्री (baobab tree), मंकी ब्रेड ट्री (monkey bread tree), सावर गोर्ड (sour gourd) और आधुनिक वनस्पतिशास्त्र में अदनसोनिया डिजिताता लिनियस (*Adansonia digitata* Linn.) कहते हैं।

इमली के वृक्ष, पत्ते, फूल, फल के साथ इस वृक्ष की कुछ भी समानता नहीं है।

गोरख इमली नाम क्यों ?

इमली के पेड़ के तने की गोलाई सात मीटर और गोरख इमली के तने की गोलाई सत्तर मीटर होती है। इमली के पत्ते असमपक्षीकार होते हैं जिनमें आठ से तीस मिलीमीटर लम्बे और पांच से दस मिलीमीटर चौड़े पर्णकों के दस से बीस जोड़े लगते हैं जबकि गोरख इमली में पांच सेण्टीमीटर चौड़े और साढ़े बारह सेण्टीमीटर लम्बे उंगलियों के सदृश तीन से सात पर्णक लगते हैं। (चित्र -4) इमली के फूल छोटे, आपीत और गोरख इमली के फूल सफेद, पन्द्रह सेण्टीमीटर व्यास के होते हैं। इमली की फली 7.5 से 20 सेण्टीमीटर लम्बी, करीब 2.5 सेण्टीमीटर चौड़ी और एक सेण्टीमीटर मोटी होती है जबकि गोरख इमली का फल घिये-सदृश बीस से तीस सेण्टीमीटर लम्बा और दस सेण्टीमीटर व्यास का होता है। इमली सेसलपिनिआसी (*Caesalpinaceae*) कुल का वृक्ष है और गोरख इमली बौम्बाकासी (*Bombacaceae*) कुल का।

यहां मैंने दोनों वृक्षों में कुछ ही अन्तर दिखाए हैं। इनमें कुछ भी साम्यता नहीं है।

फिर भी अफ्रीकी मूल के इस वृक्ष का गोरख इमली नाम कैसे लोकप्रिय हो गया ?

नाथ सम्प्रदाय के प्रवर्तक गुरु गोरखनाथ से इस वृक्ष का कुछ सम्बन्ध हो सकता है। ये साधु कनफटे बाबा कहलाते हैं। कोई-कोई नाथ अलंकरण के लिए कान में गोरख इमली के बीजों के कुण्डल धारण करते देखे गए हैं। यह बीज चिकना, चमकीला, काला और चपटे-गोल ठीपे जैसा होता है। नाथ पन्थ की परम्परा के अनुसार कनफटे बाबा को गेंडे के सींग या गेंडे की मोटी खाल से बना छल्ला कान में पहनना होता है, पर वह अत्यन्त दुर्लभ है।

तेलुगु में इस वृक्ष का नाम ब्रह्मामिल्का है। इसका अर्थ ब्रह्मा की इमली (अम्लिका) है। इससे प्रतीत होता है कि दक्षिण में भी कुछ ऐसी मान्यता थी कि यह वृक्ष किसी दूसरे लोक से आया है जहां ब्रह्मा का निवास है।

कल्पवृक्ष के नीचे इन्द्रसभा

एलोरा की गुफा बत्तीस में इन्द्रसभा का चित्र है। इन्द्राणी सिंह के आसन पर बैठी है। गोद में शिशु है। आगे-पीछे बांदियां खड़ी हैं। इनके पीछे एक वृक्ष है। उस पर दो बड़े-बड़े फल दिखाए गए हैं, बाकी सात-आठ छोटे फलों के गुच्छे हैं, बीच में एक छोटा-सा बन्दर फल तोड़ने की मुद्रा में बनाया है।

वन अनुसन्धान संस्थान, देहरादून में कृष्ण मनमोहन वैद फौरेस्ट-बोटनिस्ट थे। उन्होंने कल्पवृक्ष, गोरख इमली आदि नामों से विख्यात वृक्षों का सूक्ष्म अध्ययन किया था। उनका मत था कि एलोरा की इन्द्रसभा वाला वृक्ष कल्पवृक्ष है। अजन्ता-एलोरा के इलाके में गांवों में या मन्दिरों के परिसर में ये इक्का-दुक्का वृक्ष दिखाई दे जाते हैं। इसी इलाके में जिला बुलढाना के कारवंद में एक प्राचीन महादेव मन्दिर के गिर्द ऐसे दो वृक्ष हैं। पहले कभी यहां सात वृक्ष हुआ करते थे।

From Our Readers

Elephant Deaths

By

Bulu Imam

22nd October 2001

This is with reference to Elephant Deaths in Northeast (Sanctuary Asia, October 2001, p. 81). In this report we are told it was stated by the Forest Department that the deaths recently of eighteen elephants in Assam and Arunachal were due to an attack of liver fluke worm parasite, a parasite that is waterborne, and hence could be drunk by the animals. That this fluke parasite is found in the liver of pigs and sheep indicate the pools from which the elephants were drinking were being contaminated by domestic livestock, an unheard of thing in the past, even when there was considerable human population inside once densely forested areas, which I myself saw when I was involved with elephant control in Goalpara and Darrang districts between 1974 and 1976. The suddenness of these elephant deaths has an eerie similarity with the massive numbers of tigers poisoned, within sanctuaries even, after the blanket ban on tiger hunting was made in the early 1970s. Elephant control in Assam has similarly been banned for the past over two decades, and the increasing populations of the pachyderm have spilled over into adjoining countries, but the

simultaneously increasing pressure of population has no doubt made a confrontation between man and pachyderm inevitable. In the 1970s I remember elephants used to make long treks of upto twelve miles down from the Bhutan hills and across the miles of Terai grass, along well worn elephant trails to drink in pools of water near the villages. This is a dozen miles sometimes from the elephant habitat. So I write off the theory that the increased population led to livestock contamination of elephant drinking sources. Rather, the elephants were not being controlled by culling, and had become a great nuisance to the cultivators' crops. Therefore the report also in circulation, that the elephants were poisoned, is more than possible in fact. I read a report in the papers that crop pesticides had been used to poison elephant drinking ponds in Assam which was due to the damage they were doing to the villagers' crops, especially rice and maize.

If we recall, when tiger hunting was officially banned in India in the early 1970s the tigers were increasing in number in certain areas where they became an actual threat to the domestic livestock of the villagers, and were

poisoned off in large numbers. At that time my father Tootoo had made an appeal titled J'Accuse, An Open Letter (15th August, 1970) addressed to Smt. Indira Gandhi, our then Prime Minister, in which he had predicted the blanket ban on tiger hunting would lead to the inevitable poisoning of tigers by the villager whose cattle were killed. Perhaps this is a lesson we are to now learn with elephants.

Northern Assam's 800 kilometre elephant jungles, comprised of evergreen, canebrakes, naal and accra grasses, and huge batabans or swampy patches of bata leaves, sweep down from Arunachal Pradesh along the Bhutan hills. This region, which I have lived in for many years when involved with elephant control with the Assam Forest Department during the 1960s and 1970s is a pristine ecologically perfect elephant habitat of some eight hundred kilometres of continuous forests to the north (and sometimes south) of Lateral Highway Number One. It is the home to an estimated 3,500 wild elephants. It was the bastion of the Mela Shikar in which elephants were caught by the noosed lasso. This is the world's highest concentration of wild elephants. It has contiguous forest territories with other elephant forests in the neighbouring countries of Bhutan, Burma and Bangladesh.

That eight dead elephants were found in Nameri and seven from its neighbouring jungles in Assam, doesn't bode well for the future of the elephant in the region. The tragedy was repeated at Pakhui Sanctuary in Arunachal

Pradesh, where three elephants were poisoned. People do not resort to wildlife terrorism. We have to realize that when laws lead to violent reactions we had better check the law itself. In the case of massive tiger poisonings with Folidol, a crop pesticide, in the 1970s and 1980s, we have the evidence. It seems a similar event is happening in the world of the wild elephant. People those poison animals are pretty desperate in order to do so. The culling of predatory and crop destructive species requires to be looked at sympathetically. After all it is good game conservation and management. Culling is killing with a purpose. Hunting had always been an official form of culling until it was outlawed with a fanaticism which had overlooked the three factors: (i) Rise of population in India (ii) Destruction of habitat and wildlife corridors due to industrial projects like dams, mines, thermal power stations and other industrial undertakings, (iii) The rise of animal populations, especially among super pachyderms like the Indian Elephant and super predators like the Tiger. The ensuing events have become history.

I think we need to go back to proper scientific methods of game control without allowing poaching, and we require to look at the damage that could be avoided to wildlife habitats, especially wildlife corridors. It may be necessary to open up Elephant Control in the Northeast. I know a lot of conservationists will disagree with me but I think it is an issue that needs to be looked at squarely, and without sentimentalism.

An Urgent Appeal:

To intervene and help stop the mass poisoning of The Asian Elephant in Assam

By

A.K. (Manju) Barua*

This is written with grave concern. Some people of one single district of Sonitpur in Assam have declared a silent war against elephants. In a matter of 70 days 31 elephants have been poisoned to death.

On hindsight, it is self-evident that this area is vulnerable enough to precipitate a 'silent cleansing' of the elephant population, more so if we pause to consider the following three points: (i) systematic destruction of elephant habitat in the district; (ii) people's protest against elephant-depredation progressively taking a more organised form; and (iii) various experts being in agreement about identifying this district as a representative area for elephant depredation.

It is matter of deep regret that we were all informed about the explosive nature of the situation but did not foresee that anti-depredation would take such a tragic turn. The present state of affairs is shocking.

By elaborating the above-mentioned points I wish to place on record that the Government and the wildlife conservation conscious community are aware of most aspects of this matter.

1) The five Reserve forests (RF) located in the eastern part of the District, where the series of mass killings are occurring, have experienced systematic destruction of forests. As per a Departmental survey in 1999, area under encroachment in Balipara RF (189.74 sq km) was 70.1%, in Biswanath RF (109 sq km) was 95.60% in Nadhuar Reserve Forest (73.35 sq. km) was 43. 19%, in Behali Reserve Forest (140 sq km) was 42.84% and in Charduar RF (241.07 sq km) was 55.09%. The Rowta RF (77.42 sq km), which does not lie in the eastern part of the district, has only 3% area under encroachment. The encroachments have been done for the purpose of agriculture and homestead. These encroachment figures are for 1999 but this trend has been on the increase ever since. Also, all such encroachments are

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not happening in inaccessible and remote corners and in some places clear felling of trees is being carried on, in broad daylight, right next to the highway and under the very noses of the civil, military and forest administration. The Government is well informed about these encroachments, also because top civil and military administrators of the State regularly frequent nearby wilderness areas for their recreational value. Moreover, the State's present Forest Minister G.C. Langthasa had recently announced that encroachments in RFs would be legalised. This is the tragedy that afflicts our elephant and tiger habitats.

(2) In the last seven years during the pinch period (winter months before paddy harvesting) people's protest against elephant depredation has become more and more broad based and organised. The Government is aware of the mood of these protestors as their delegation are now coming to government offices in large processions with placards and shouting slogans. Such scenes have been witnessed in the Deputy Commissioner's office precincts. Moreover, forest personnel are regularly assaulted. There is little political will to prevent these assaults.

(3) Elephant depredation related studies, surveys and projects, workshops conducted by governmental or non-governmental agencies in the last seven years have all established that the area of the present mass killing of elephants is the representative area for elephant depredation. Organisations like the

Smithsonian Institute, Asian Elephant Conservation Centre, WWF-I, and other experts, professional foresters, wildlife conservationists have agreed upon the fact that this area is very vulnerable. Such reports and studies with causes and feasible or unfeasible remedies are lying in various offices of the government and non-government agencies the world over. They collect dust and few care to read or use their intelligence to remedy the situation.

In the matter of 20 elephants poisoned in and around Nameri National Park and Naduar RF (Sonitpur East Division) between July 3rd and 13th August, it was confirmed on the basis of various reports that the deaths were due to poisoning. However the Department failed to activate the Police machinery to identify and apprehend the culprits who perpetrated the poisoning. Because of this, unscrupulous elements have been encouraged to carry on this mode of extermination. This in itself is a shocking example of governance and enforcement. Subsequently, in the next month (Aug.-Sept. 2001) 4 elephants were poisoned in Charduar RF, Dhekiajuli and yet again 7 elephants were poisoned to death in Goroimari near Tezpur airport (incidentally, Goroimari, before the airport was established there, was a Reserve Forest).

Our Forest Department is world-renowned for its anti-poaching operations with regard to rhino conservation, but has been totally complacent in taking an anti-poaching stance concerning the series of mass

murder of elephants. With the approach of harvesting season the situation is expected to get worse. Action, fully backed by the Government, needs to be taken by the ground level Forest and Police administration. This should be on war footing.

The State Government must activate the Police apparatus and immediately devise a collaborative anti-poaching strategy to identify and apprehend the culprits. We have approached the proper forum from time to time in this and related matters. But nobody listens and all our laws are being abused and violated.

I appeal to the world community of conservationists who are concerned about the fate of the Asian elephants to write to the concerned authorities who can put a stop to the series of mass poisoning.

The gist of their communication should be as follows:

With regard to the series of incidents of mass killing of wild population of the Asian elephants by poisoning, which has occurred in recent months, wherein 70 days 31 elephants were killed in the Sonitpur district of Assam, we request you to immediately activate the State Police Department to tackle the matter in collaboration with the Forest Department so that the culprits are identified and apprehended. This, if done immediately would prevent further occurrence. Otherwise the State of Assam will loose most of its wild elephants.

Kindly use your good office to apprehend the culprits and stop further killings and prevent the prevailing shocking state of affairs.

Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts, Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of india in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects for the study of threatened species and related objects and to provide reference and reserch facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Socitiei of India will entitle you to?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
- (6) You will be entitled to buy at concessional rates the Societies Greeting Cards, Calendars, Tie, Lapel badges and the Balance of Nature Game (specially Published in colour for its educative and recreational values).
- (7) You will be supplied "Cheetal", the quartely journal of the society free.

3. For membership particulars write to Honorary Secretary, Wildlife Preservation Society of India, 7 Astley Hall, Dehra Dun.

Wildlife Preservation Society of India

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